Video Clarity

Tools for Video Analysis

ClearView AV Analyzers

System Guide

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ClearView AV Analyzer Systems

Video Clarity created ClearView AV Analyzer Systems (ClearView) to provide video researchers, codec developers, hardware designers, TV Network operators and QA/QC engineers with the unique ability to play, view, record, and objectively analyze audio and video.

ClearView allows the capture of video content from virtually any source -- file, SDI, HD-SDI, DVI, HDMI, Component, Composite, S-Video and IP. Regardless of the input, the video is, based on user choice, either recorded as is in uncompressed 4:2:2 Y'CbCr, 4:4:4 RGB, ARGB, or RGBA or converted to one of these formats from a compressed file format or stream.

ClearView applies various objective and perceptual metrics to each frame of the video sequences, generates graphs, detects anomalies outside of the threshold range, and logs the results.

ClearView has both No Reference and Full Reference Metrics. When there is no comparable video, no reference metrics can be used to determine anomalies like loss of video, frozen video, loss of audio, etc. With a source video comparison, quantitative scoring can occur. ClearView is constantly growing in functionality, and currently supports:
(Refer to Select Objective Measurements section for definitions)

Full Reference Objective Metrics
- Video PSNR
- aFreq

Full Reference Perceptual Metrics
- Sarnoff's JND
- University of Texas' MS-SSIM ported to DMOS
- PEAQ

No Reference Metrics
- Number of Edges (Spatial / Sobel Filter)
- Frame-to-Frame Differences (Temporal)
- Loudness (aPeak and LKFS)

To aid in subjective video analysis, ClearView displays the video sequences at any rate in side-by-side, seamless split, or split mirror.

- **Please note that throughout this manual in most instances where a feature is described as "Video", it will apply to both Audio and Video.**

Playback Features:

Output rates are independent from input rates; so any video sequence can be output at rates up to 120Hz. The user has control over shuttle rates, jog, color look-up tables, zoom/pan, and field display. The video sequences are previewed within the ClearView Interface and sent to HD-SDI, SDI, Component, S-Video, Composite, DVI/VGA, DP, and HDMI.

Normally, the video sequences are shown on the same display, ClearView systems with a dual output SD/HD video sequence can be output via a separate HD-SDI/SDI link. This excludes 4K formats in this version (8.0).

Compete Video Sequence, or partial selection of the video sequence from selected in and out points, can also be exported as uncompressed BMP, RAW, AIFF, MOV or AVI files.

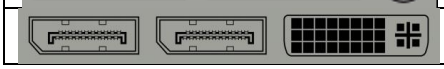
Hardware Quick Start Guide

ClearView Analyzers comes in three models. The systems are depicted below. Each system is geared to help in a certain segment of the market, while each system runs the core software to maintain compatibility throughout the family. Only a keyboard, mouse, power cable, display and the appropriate input/outputs need to be connected.

Figure 1: Product Family

-The **ClearView Extreme** (left) has several product options. Extreme 4K allows 3840X2160 split screen of two sequences for subjective viewing up to 60Hz. The Extreme X2 allows dual IO and dual subjective viewing of up to 1080p/60Hz. The Extreme DP model allows for 4K, 10 bit per component RGB playback and the DP-4K model provides an additional single CV-SDI-IO- 4K module.
-The **ClearView Shuttle** (middle) A portable solution with two model options for single or dual IO as well as a combination of ClearView with RTM*. (*see RTM System Guide for operating details)
-The **ClearView QA** (right) is for QA/QC operations where only objective metrics are necessary for unattended pass/fail testing. Software options are available to provide full ClearView capabilities for the QA model.

Table 1: Hardware Modules

	CV-SDI-IO-4K for Single or Dual IO Models
	CV-SDI-IO-LHI for Single or Dual IO Models
	CV-SDI-IO-CVD Legacy model
	CV-SDI-IO-CVD22
	CV-SDI-IO-DL Legacy model
	CV-DVI-O Legacy model
	CV-DP/DVI-O

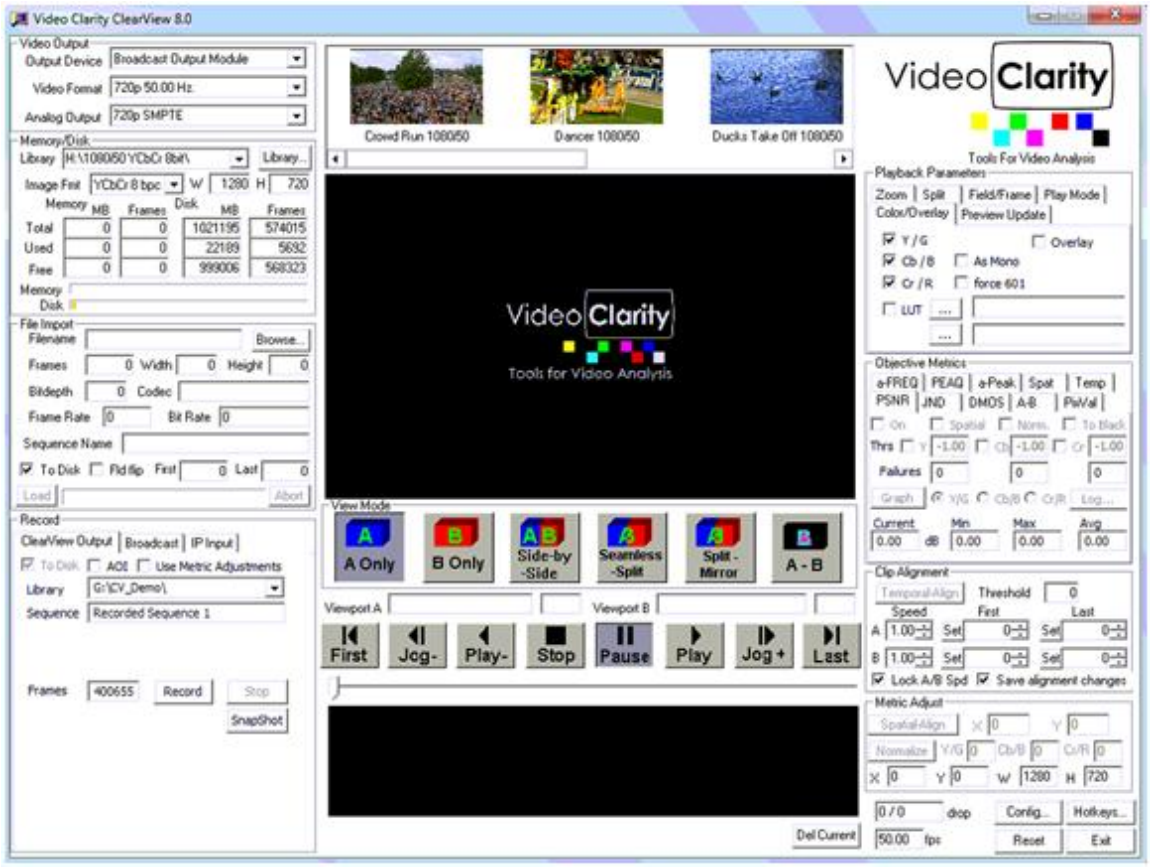
ClearView supports high-speed disk access using Raid 0. The captured video sequences are stored on the array in fully uncompressed format in any of the following user-selectable formats:

Y'CbCr 8-bit Y'CbCr 10-bit RGBA 10-bit	ARGB RGB RGBA 8-bit

Software Quick Start Guide

Double-click on the **ClearView** icon on the desktop. The following screen will launch.

Figure 2: Initial Screen



You have several options when starting to use ClearView.
If you do not have any video sequences loaded, then you must load one or more:

- You can import a file.
- You can capture/record from hardware I/O:
  - HD-SDI, SDI, HDMI or ClearView I/O channel

Now you can

- Play one (1) video sequence at any rate, change the color parameters, etc.
- Compare two (2) video sequences on two separate disk volumes (G: & H:) to visually inspect differences.
- Run the objective metrics on one (1) or two (2) video sequences

The following three figures outline the general steps to do each of the above actions. Each box in the figures is described under "Operations".

You can click on any hyperlinked box to review the actions needed unless the box is double-lined. In the double outlined box, this is an informative result.

Figure 3: Import a File

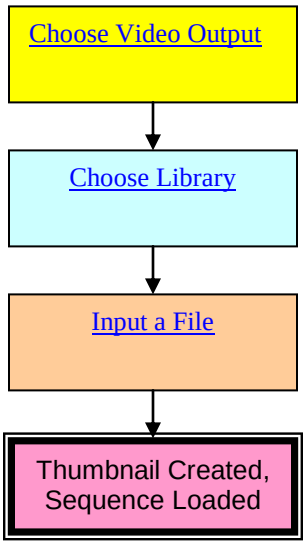


Figure 4: Record from Hardware Input

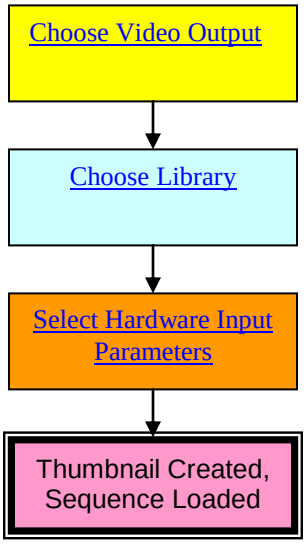


Figure 5: Play 2 Video Sequences

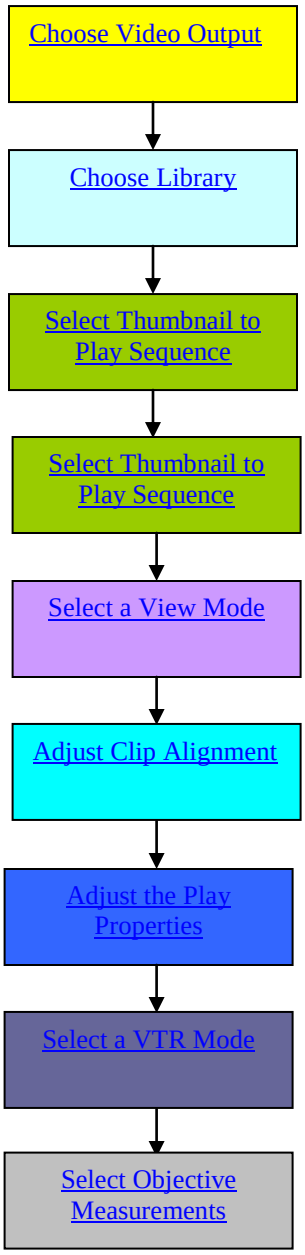
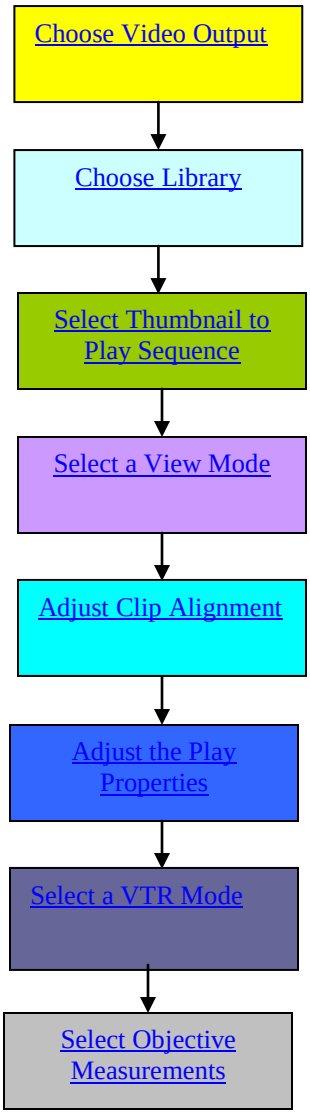


Figure 6: Play a Video Sequence



Operations

The ClearView GUI screen consists of a number of panes dedicated to specific functions. In the GUI, these panes appear generally in the order of use from top left to bottom right during a typical video quality analysis session.

Figure 7: ClearView GUI

ClearView allows full control over all of the engineering parameters, which can be selected in any order. (The preferred sequence is shown under "Software Quick Start Guide".)

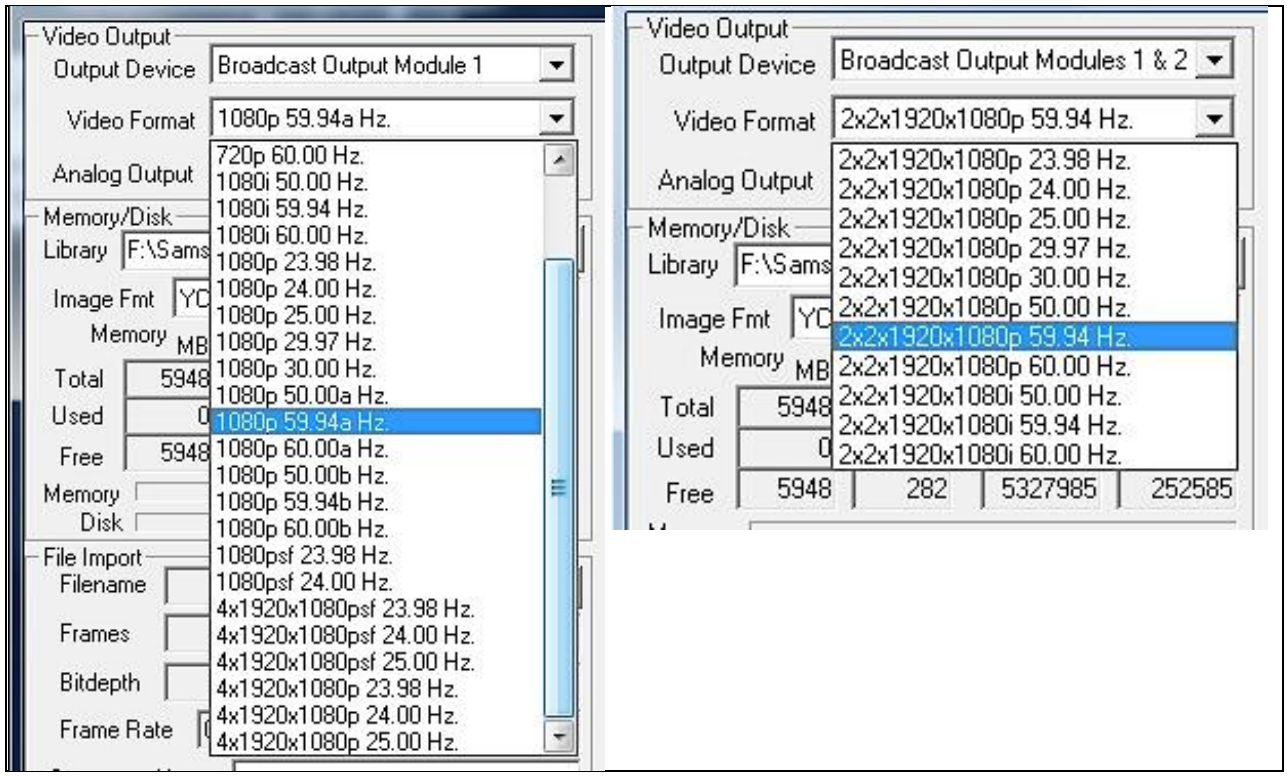
- Choose Video Output using the Video Output pane (in the top left corner of the GUI)
- Choose Library using the Memory/Disk pane
- Input a File using the File Import pane
- Select Hardware Input Parameters using the Record pane
- Select Thumbnail to Play using the Sequence Manager pane
- Select a View Mode using the View Mode pane
- Adjust Clip Alignment using the Clip Alignment pane
- Adjust the Play Properties using the Color Space, Split, Play Mode, and Field/Frame panes
- Select a VTR Mode using the VTR buttons under the View Mode pane
- Select Objective Measurements using the Objective Metric graph and the Objective Metric and Color Space panes

The video clip being played and analyzed is shown as a sequence name in Viewport A or B, above the VTR buttons.

Choose a Video Output

The Video Output controls ClearView's uncompressed video format to be displayed on external monitors, and also affects the input format during record.

Figure 8: Video Output Device Module SD, HD or 4K

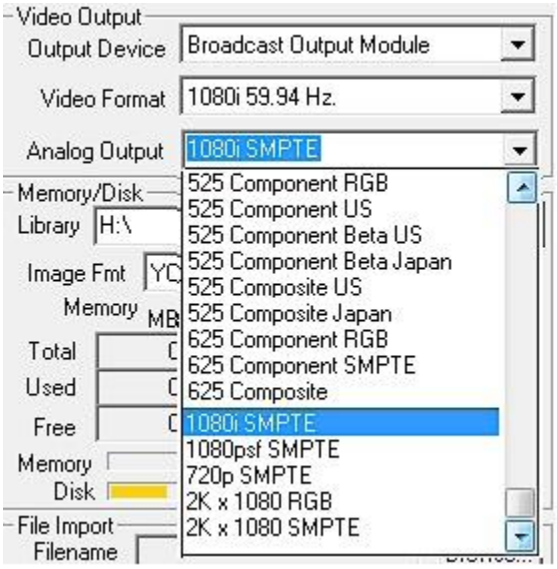


Note: For 4K format playback and output interface configuration requirements, see hardware module section CV-SDI-IO-4K.

Table 2: Video Output Pane Descriptions

Output Device	The list of Output Devices depends on the optional ClearView Output Modules installed. Three possible Output Devices are selected from a pull-down menu: • **No Video Output Module** – display a preview of the video Y'CbCr, RGB, ARGB, RGBA in the GUI on the DVI/VGA desktop display. • **Display Port Output Module** – DP1.2 or DVI-DL display RGB (10 bit) onto the secondary DP1.2 display and on the primary DVI/VGA display. • **Broadcast Output Module** – display Y'CbCr onto the HD-SDI Monitor and display RGB on HDMI, up to 4K with One (1) or Two (1 & 2) Modules.
Video Format	The list of available **input and output** resolutions/frame rates depends upon the Output module user selections. • **No Video Output Module** has no restrictions, and has *Create New* feature • The **Display Port Output Module** is restricted by the EDID codes defined by the second display's capabilities. • The **Broadcast Output Module** conforms to broadcast specifications provided by DVB and SMPTE.
Analog Output	Defines the type of analog output when using the Broadcast Output Module (i.e. Composite, S-Video or Component). The Output is sent out the selected analog output and simultaneously to SD/HD/3G SDI.

Figure 9: Analog Output Device Module SD, HD, 2K



The **No Output Device** uses ClearView's desktop DVI-DL/VGA output to display the video sequences.

The **Broadcast Output Device** uses the HD-SDI, SDI, and Component, S-Video, or Composite output. In addition it also includes 4 stereo channels of AES-EBU on XLR and eight (8) mono channels in embedded SDI (2 in/ 2 out while simultaneously playing and recording). VANC data can be captured and played. VANC acts like a bigger raster size. The audio & VANC controls are turned on/off via the Configuration Menu.

The **No Output Device** and **Display Port/DVI Output Device** allow custom video resolutions and frame rates. Any video resolution can be specified. However, the software follows the display's EDID codes. Therefore, you must attach a display that is capable of the specified resolution and frame rate.

After selecting an Output Device, a list of available video format and analog outputs for the Output Device are displayed in the Video Format pull-down menu. For example, if the Output Device is Broadcast I/O, the Digital Format can be 1080i 59.94Hz, and the Analog Output will correspondingly be 1080i SMPTE. Rate and format conversion may not be disparate between the two settings.

Note: *If you did not start the machine with the primary display connected, the DVI module may not read the EDID codes correctly, and you will need to reboot.*

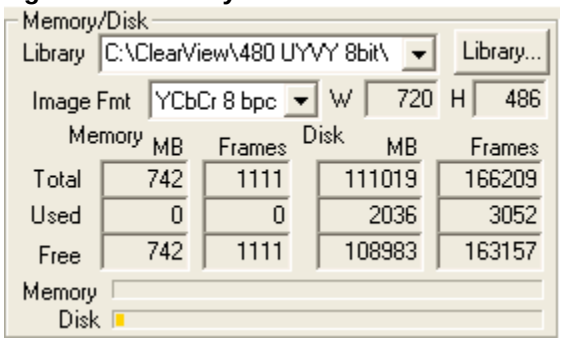
The formats 1080p50b, 1080p59.94b and 1080p60b are available for CV-SDI-IO-LHI and CV-SDI-IO-CVD22 Modules only.

When using 4K, supported Analog formats will be grayed out, as it is only used for the Genlock option to sync Output Modules 1 & 2.

After a Video Format has been selected, the ClearView memory is tiled to the resolution of the selected format. Video sequences imported after this selection is made are either padded with black to the current resolution or are clipped to the current resolution.

For example, if ClearView is operating in 1080i at 59.94 Hz, the resolution is 1920 x 1080 based on the industry standard. If an NTSC sized sequence is loaded, it will be centered in 1920 x 1080 and padded with black on all four sides.

Figure 10: Memory/Disk



The image format must be chosen next. This item is shown in the Memory-Disk Pane.
The choices are as follows:

- Y'CbCr 8-bit – this is a Broadcast I/O format
- Y'CbCr 10-bit – this is a Broadcast I/O format
- ARGB 8-bit – this is a Display Port and DVI I/O format
- RGBA 8-bit – this is a Broadcast I/O format
- RGB 10-bit – this is a Broadcast I/O format
- RGB 8-bit – this format consumes less space for DVI I/O format
- BGR 8-bit – this is a Broadcast I/O format

Any video sequence, regardless of its actual input image format, can be loaded into any image format. After it is input to a specific image format it can only be output to a compatible display. Any format will work in No Video Output mode.

Note: video sequences already loaded will not play if the Output Format does not match the clip's output format when it was originally loaded. If you want to view a video sequence that was previously loaded in a different output format, then you will need to reload it. To view the properties of any video sequence, hover the cursor over the thumbnail or view the video sequences in detail mode.

Table 3: Memory/Disk Descriptions

Library	The Library button allows storage location and organization of the video sequences. You can change libraries by pulling down on the tab or by selecting the "Library" button. The library button also accesses the library manager controls like delete, move, copy, etc.
Image Fmt	Select the Image format. Choices include: Y'CbCr, RGBA, RGB, BGR, ARGB, 8-bit, 10-bit. The image format is described in Choose a Video Output
W & H	Width and Height are informational. These are set in the Choose a Video Output pane
Memory & Disk Statistics	These fields display the Disk and Memory statistics for informational purposes (Total, Used, Free, megabytes, number of fields)
Y'CbCr 8 bpc	8 Bit Y'CbCr, 4:2:2 Sampling
Y'CbCr 10 bpc	10 Bit Y'CbCr, 4:2:2 Sampling
RGB 8 bpc	8 Bit RGB, 4:4:4 Sampling formatted for the DVI Output Module
BGR 8 bpc	8 Bit RGB, 4:4:4 Sampling formatted for the DVI Output Module
ARGB 8 bpc	8 Bit RGB, 4:4:4 Sampling formatted for the DVI Output Module
RGBA 8 bpc	8 Bit RGB, 4:4:4 Sampling formatted for the Broadcast Output Module
RGB 10 bpc	10 Bit RGB, 4:4:4 Sampling for the Broadcast Output Module 3G and Dual-link.

Choose a Library

The Memory-Disk Pane displays the Memory and Disk properties, allows the selection of image format, and lets the user control the library file system. A library acts like a Windows directory, with a few differences.

Similarities:

- Much like Windows directories, you should organize your video sequences together in a meaningful way. For example, all of the 1080i, 59.94, 8-bit video sequences could be placed in a folder with a useful name about the format, like “1080i_60Hz_8bit”.
- You can copy, move, delete and sort video sequences by selecting a **complete library folder**.

Differences:

- Libraries have an index file which catalogs metadata information about the video in a file called **“sequences.xxx”**. This index file holds information like the sequence name, resolution, thumbnail to display, looped playback frequency and mark-in/mark-out points, etc.
- Each video sequences has 3 files associated with it – the uncompressed video sequence with a large file size, the uncompressed audio sequence, and a text overlay file. The text overlay file contains the text to be displayed when overlay is checked. The default names should be the same as the sequence name. Since this is a text file, it can be easily changed using any text editor.

  NOTE: ***Do not delete*** *these files called* ***“sequences.xxx”*** *as it will result in a loss of the video loaded in the entire library file system.*

  The ClearView file system is configured as ***Raid 0****.* ***Please back up the system****. As long as you restore the “sequences” catalog file, you do not need to restore the entire library’s uncompressed video files, if you need to conserve space.*

ClearView uses its own file system to ensure playback and record integrity. Based on the system purchased, we ensure up to two channels of 1080P/60Hz playback, or one 4K/60Hz.

To change libraries, you can simply choose a different one by selecting the pull-down menu display of recently used, or you can select the “Library” button. If you choose the Library button, the following will be displayed.

Figure 11: Library Manager Controls

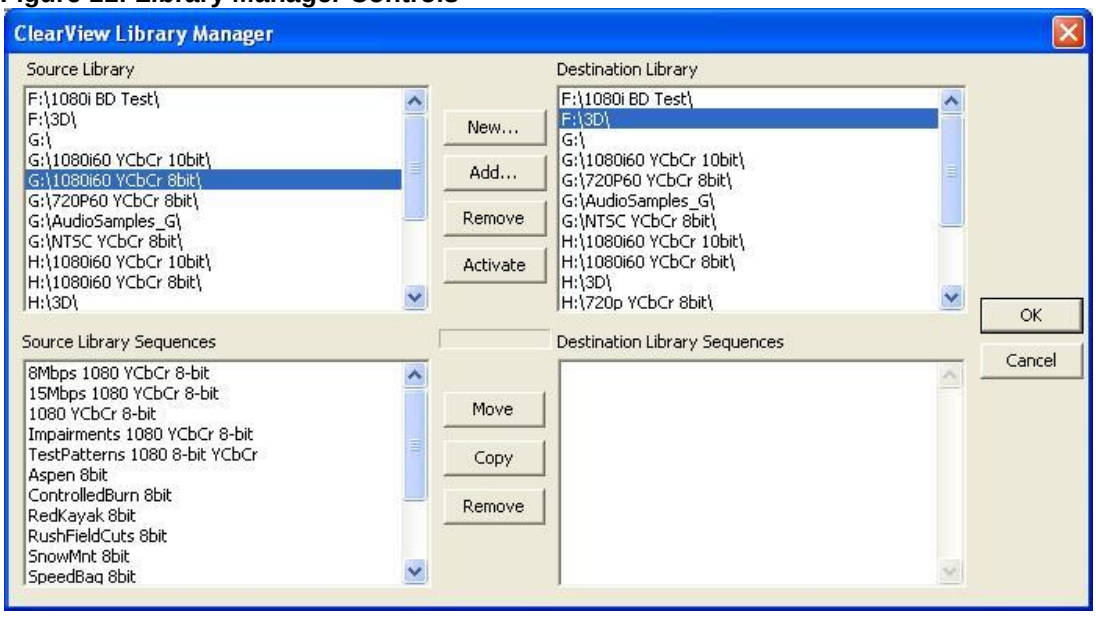


Table 4: Library Manager Descriptions

New	Creates a new library. • Create a directory using the standard Windows using the **New folder Icon** • Open the directory • Choose the sequences file location and select **Save**.
Add	This allows ClearView to recognize a library imported from outside ClearView. For example: restoring a library from tape backup or copying a library from another ClearView system. *ClearView needs to reference the sequences file in each library. This command activates a selected sequence's file system.* • Select the Source Library "**sequences.xxx**" • Press the **Add** button
Remove	This removes the sequences file from an existing directory. • Select the Source Library • Press the **Remove** button
Activate	This reads the sequences file, and places the thumbnails and details in the Select Thumbnail to Play pane. • Select the Source Library folder • Press the **Activate** button
Move	This allows you to move a video sequence from one Library to another Library • Select the Source Library • Select the Destination Library • Select the video sequence to Move • Press the **Move** button
Copy	This allows you to copy (duplicate) a video sequence to another Library • Select the Source Library • Select the Destination Library • Select the video sequence to Copy • Press the **Copy** button
Remove	This allow you to delete a video sequence • Select the Source Library • Select the video sequence to Remove • Press the **Remove** button
OK	Closes this dialog box and accepts the changes *Note: Before choosing Ok, you **must select and Activate a Library** or the original Library will continue to be shown.*
Cancel	Closes this dialog box and does not accept any changes made

Import a File

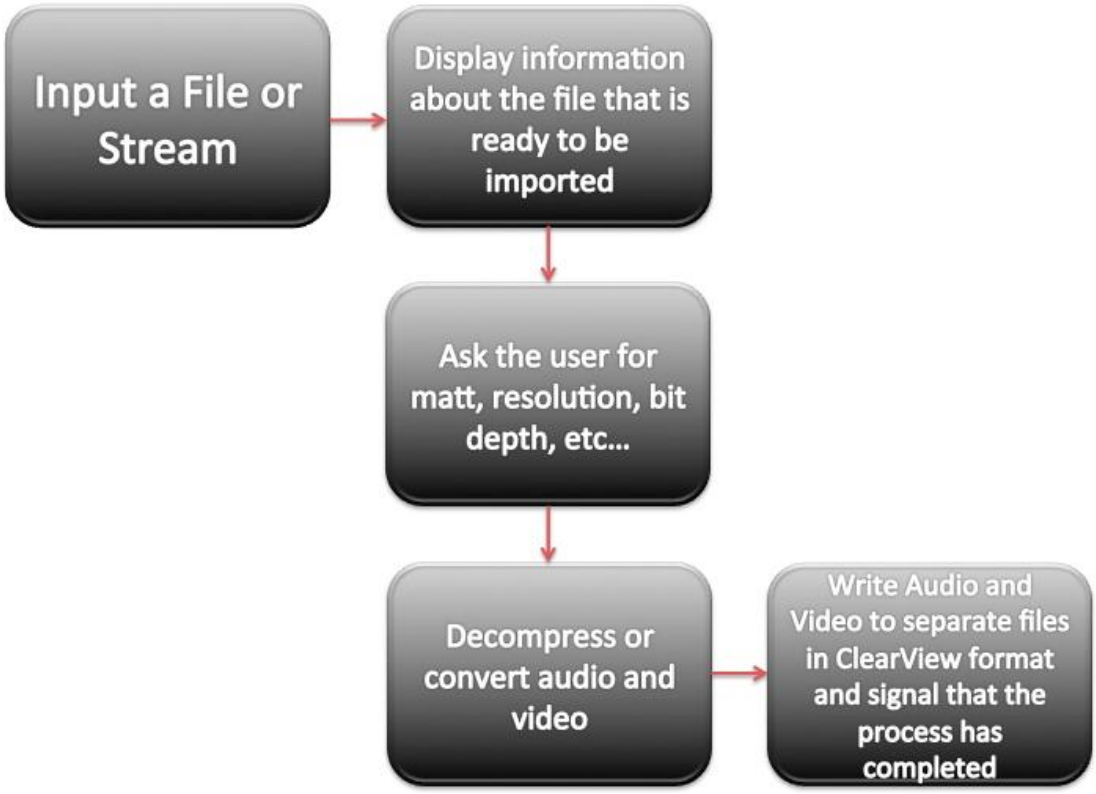
There are two ways to import files:

1) File Import tool pane in the left center of the ClearView GUI.
2) ClearView's *"File Importer.exe"*

ClearView File Importer

The ClearView ***File Importer.exe*** is powerful video and audio decoding tool built to provide users the added benefit of several content processing features.

Figure 12: ClearView File Importer Workflow


Input a File or Stream
Display information about the file that is ready to be imported
Ask the user for matt, resolution, bit depth, etc...
Decompress or convert audio and video
Write Audio and Video to separate files in ClearView format and signal that the process has completed

Once the video file is selected, File Importer will reflect source media information, which is the following:

- Compression/file type (H.264, MPEG-2, BMP, MOV, etc)
- Video height & width
- Video Bit-depth
- Frame rate
- Number of frames in the file
- Video bit-rate
- Audio bit rate
- Number of audio channels
- Audio sampling frequency
- Audio bit depth
- Show info for a selected PID in the MPTS (Multi Program Transport Stream)

In the case where a (*.ts) transport stream is MPTS, the file contains multiple programs, source information will be updated with corresponding input, according to the selected Hexadecimal PID (Program ID).

Settings and Adjustments

The following output adjustments are available to configure output options and start the decoding process

- Output frame size
- Output frame rate
- First/last frames to import
- De-interlace or not
- Bit depth – converting 8 to 10 or 10 to 8 bits
- Crop source (x, y, width, height) with values or interactive graphical box
- Scale up or down to xmb / w,h
- Color Space – convert from YUV to RGB by using either SD or HD color space
- Import audio Yes/No
- Output image resolution
- Output canvas resolution
- Truncate to legal broadcast values (Yes/No)

Two screens in the top of the File Importer window reflect the input (original) and output (maintained) preview of the source video. The output preview screen will dynamically adjust according the settings defined in the Output Sequence section.

In order to start the decoding process a ClearView Library, which is the target destination of the output file, should be selected. A Library is defined in the ClearView application and is being used as the output folder for File Importer.

This process may be started by clicking on the **'Import'** button. During the video-decoding process, a progress bar is displayed. Once the process is finished, the status bar message will indicate that Video Import has succeeded.

Decoded video and audio are stored in Library folder in separate files. The Audio file's location may be different, according to the settings in ClearView application.

Upon decoding process completion, Metadata information is stored in the sequence index file called "sequences". It contains the following information for each sequence in the library folder.

- Frame-rate
- Resolution
- Bit-Depth
- Number of frames
- Audio present (or video only).

ClearView File Importer is the single-window application in which all the settings are configured on the main screen. The File Importer is also a standalone application and included module.

ClearView Dependencies

Library

Libraries are the maintenance folders, used in File Importer and ClearView applications. File Importer destination folder may be used as ClearView input source. Basically, Libraries may be considered as shared locations for File Importer and ClearView.

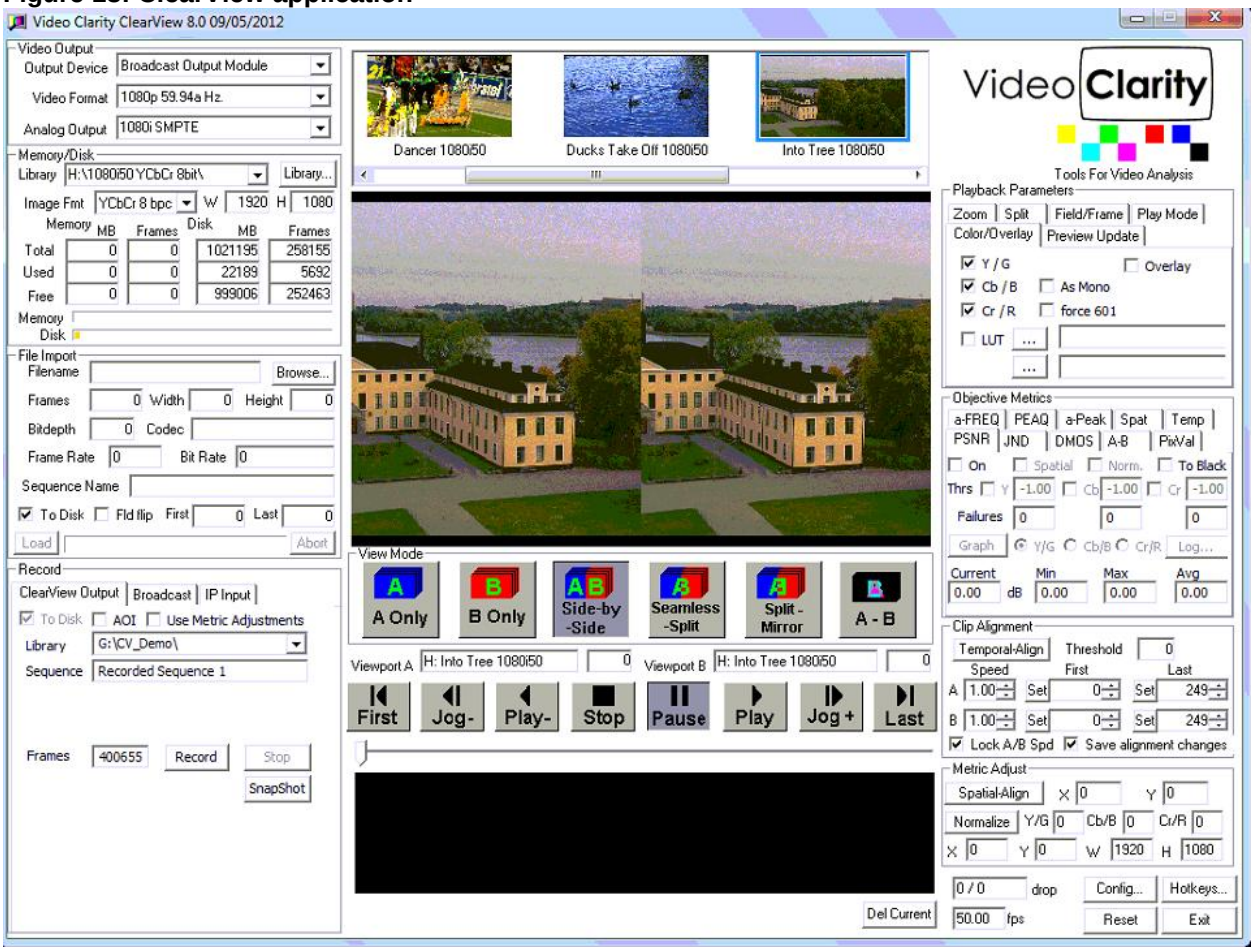
ClearView Library folder specification

Libraries have an index file which catalogs information about the video sequences. This index file holds information like the sequence name, the resolution, the thumbnail to display, the playing frequency, the mark-in/mark-out points, etc. The file name for this catalog is “sequences”. Please do not delete this file as it will result in a loss of the video sequences in the entire library. Each video sequences has 3 files associated with it – the uncompressed video sequence, the uncompressed audio sequence, and a text overlay file. The text overlay file contains the text to be displayed when overlay is checked. The default name is the sequence name. Since this is a text file, it can be easily changed using any text editor.

Additionally, Libraries, created in ClearView will be accessible as Output Sequence Libraries in File Importer applications.

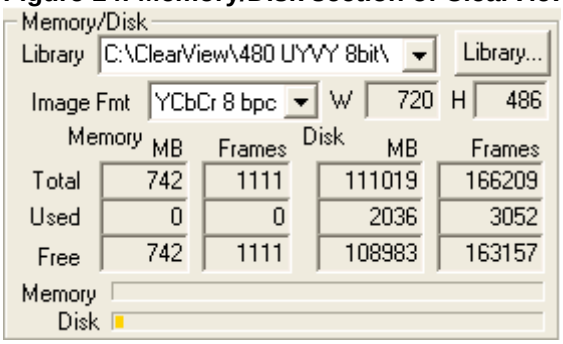
Launch ClearView application icon from the desktop.

Figure 13: ClearView application



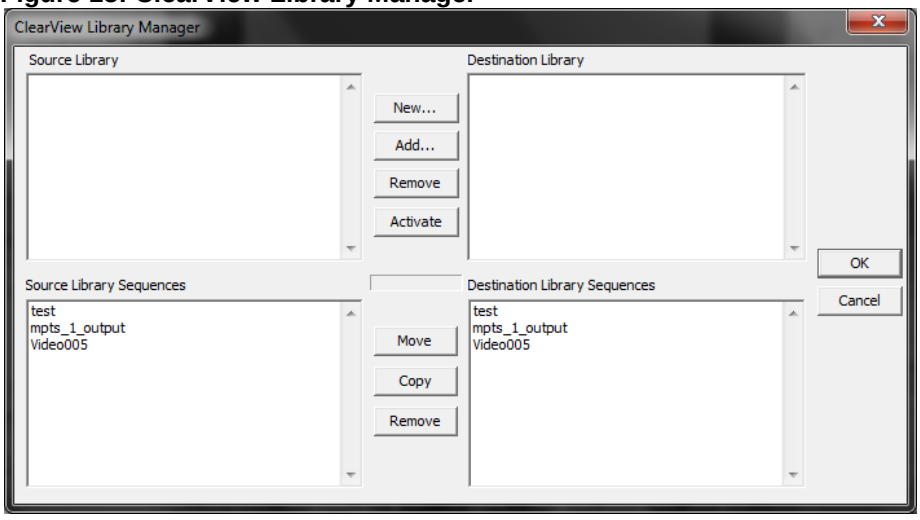
1. Click on ‘Library’ folder of ‘Memory/Disk’ section:

Figure 14: Memory/Disk section of ClearView



2. Click ‘New’ button in the ‘ClearView Library Manager’ to create new Library. Using the Windows Explorer, navigate to the folder that will be used as the destination for File Importer output, for example *‘H:\1080i50 YCbCr 8bit\’* path.

Figure 15: ClearView Library Manager

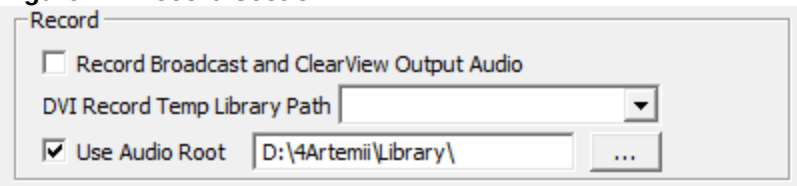


The ClearView system has no restrictions on the number of libraries that may be created. All new Libraries will be accessible in the 'Library' drop down list of Output Sequence section in File Importer.

Audio Root Usage

Decoded Video and Audio files are stored in a specified destination, based on the 'Use Audio Root' option in **'Config'** screen. Having the option checked, all Audio files from the decoded videos will be kept in the selected location, separate from the video files.

Figure 17: Record section



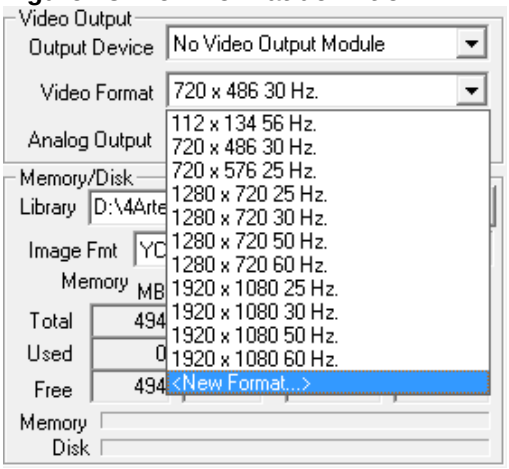
1. Within ClearView application, press on '**Config'** button, see the '**Record section'**.
2. Check the **'Use Audio Root'** checkbox.
3. Fill in the path for Audio files to be stored manually, or press on the browse button with three dots. Select Audio root location folder using Windows Explorer.
4. Click **'Save'** button to apply the selection.

Specify Resolution to store

The ClearView application allows creating a custom set of resolutions and refresh rates that may be used in the '**Video Format'** drop-down list of File Importer, when the **'Output Module'** is set as **'No Video Output Module'** and **'Display Port'.**

Imported video may be decoded in any of the user-defined **'Video Format'** applying any desired **'Source Modification'** and **'Output Sequence'** configurations. In order to define new resolution and refresh rate in ClearView application, please follow the steps below:

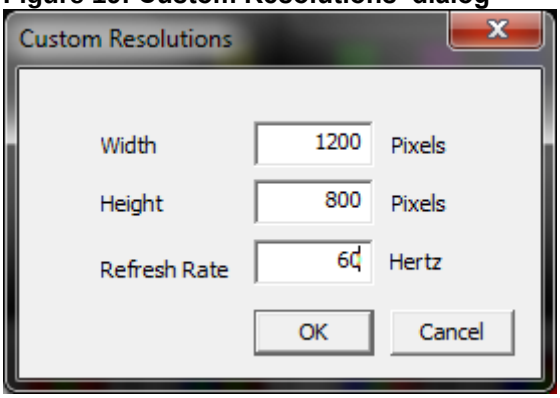
Figure 18: New Format definition



1. Launch ClearView application.
2. Expand **'Video Format'** drop down list of **'Video Output'** section.
3. Click on **'<New Format…>'** in the bottom of the expandable list.
4. In the 'Custom Resolution' displayed dialog specify the following:

- ***Width (Pixels)*** – Horizontal amount of pixels
- ***Height (Pixels)*** – Vertical amount of pixels
- ***Refresh Rate (Hertz)*** – Frames per second

Figure 19: Custom Resolutions' dialog



5. Click **'OK'** button to save custom resolution. Click **'Cancel'** button to discard the changes made in the **'Custom Resolution'** screen.

After the new resolution is added in ClearView, it may be used in the File Importer application for video decoding purposes.

Note: It may be needed to restart File Importer application in order to get a user-defined resolution to appear in the **'Video Format'** drop-down list.

Output File Allocation

Once the video is decoded using File Importer application, the following files are created, according to the Sequence Name provided in the Output Sequence section.

Decoded Files:

- **<Sequence Name> (with no extension)** – Decoded Video raw data
- **<SequenceName>.aud** – Decoded Audio raw data, may be stored either in Output Library folder, configured in File Importer application, or in a custom location, according to **'Use Audio Root'** option in the ClearView application
- **<FileName>.grf** - Stored graph that performs decoding.
- **<SequenceName>.cvo** - This text file contains just the name of the sequence for overlay.

Using File Importer

File Importer video decoding adjustment and execution may be done in two ways:

- Using Graphical User Interface;
- Using Command Line Interface

Launch Application

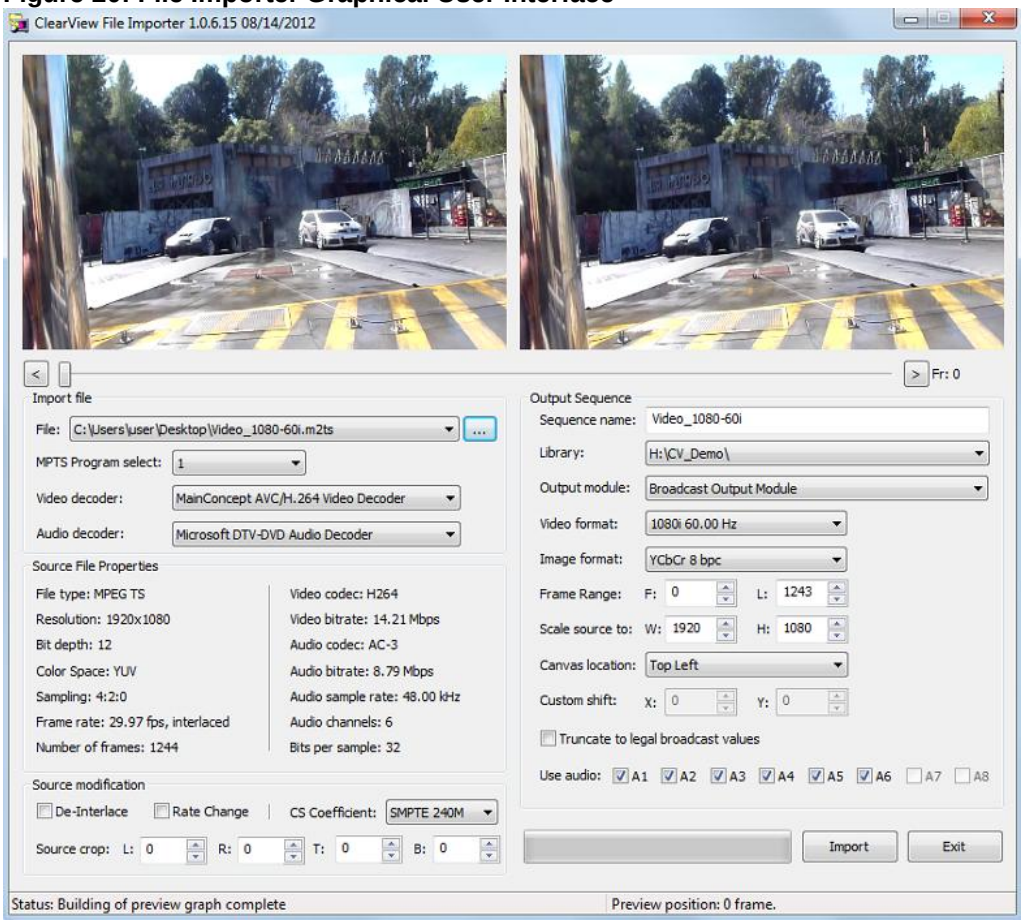
File Importer application may be launched the following ways:

- Double click File Importer shortcut on the *Desktop*;
- Click 'File Importer' in *Start – All Programs – VideoClarity*.
- Invoke 'File Importer' executable file in *C:\Program Files\Video Clarity\FileImporter* folder.

Note: Default Installation path on x64 systems is:
C:\Program Files (x86)\Video Clarity\FileImporter

Graphical User Interface

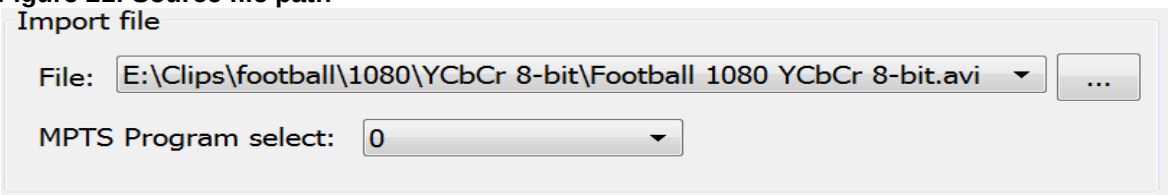
Figure 20: File Importer Graphical User Interface


ClearView File Importer 1.0.6.15 08/14/2012
Fr: 0
Import file
File: C:\Users\user\Desktop\Video_1080-60i.m2ts
MPTS Program select: 1
Video decoder: MainConcept AVC/H.264 Video Decoder
Audio decoder: Microsoft DTV-DVD Audio Decoder
Source File Properties
File type: MPEG TS
Resolution: 1920x1080
Bit depth: 12
Color Space: YUV
Sampling: 4:2:0
Frame rate: 29.97 fps, interlaced
Number of frames: 1244
Video codec: H264
Video bitrate: 14.21 Mbps
Audio codec: AC-3
Audio bitrate: 8.79 Mbps
Audio sample rate: 48.00 kHz
Audio channels: 6
Bits per sample: 32
Source modification
De-Interlace
Rate Change
CS Coefficient: SMPTE 240M
Source crop: L: 0 R: 0 T: 0 B: 0
Output Sequence
Sequence name: Video_1080-60i
Library: H:\CV_Demo\
Output module: Broadcast Output Module
Video format: 1080i 60.00 Hz
Image format: YCbCr 8 bpc
Frame Range: F: 0 L: 1243
Scale source to: W: 1920 H: 1080
Canvas location: Top Left
Custom shift: X: 0 Y: 0
Truncate to legal broadcast values
Use audio: A1 A2 A3 A4 A5 A6 A7 A8
Import
Exit
Status: Building of preview graph complete
Preview position: 0 frame.

Import File

In order to start working with File Importer application it is required to import a video file, which will be decoded according to the output options specified.

Figure 21: Source file path



Files may be imported the following way in to the File Importer application:

- **Drag and drop** – select media file you would like to use for decoding and drag it in to the File Importer screen. Once dragged, release the selected file.
- **Browse file** – Provides the ability to import files from any specific location using Windows Explorer.

In order to browse for a file, please follow the steps below:

1. Within opened File Importer application, click on the button with three dots next to the 'File' drop-down list.
2. Navigate to the desired file using Windows Explorer.

Table 5: File Importer File Types

Extension	File
.264, .h4v	MPEG-4/AVC, H.264 video file
.264, .h4v	MPEG-4/AVC, H.264 video file
.afreq	Video Clarity aFreq parameters
.tpeak	Video Clarity aPeak(TruePeak) parameters
.avi	Video for Windows – any CODEC loaded
.cin	Cineon
.cvp	ClearView auto play list
.did	Device Independent Bitmap – MS Windows
.dif	DIF Stream
.dmos	MS-SSIM using the DMOS Scale parameters
.dps	DPS Velocity Video Editing Files
.dpx	DPX
.gen	AvidDS
.icb	TGA Still Image Variant
.jpg	JPEG Still Image
.jnd	ClearView Sarnoff's JND parameters
.js	Jaleo – SGI editor
.lkfs	Video Clarity LKFS parameters
.mpg. mpeg, .vob, .m1v, .m2v, .m2p, .m2t, .mpv	MPEG-2
.mpg, .mpeg, .m1v	MPEG-1
.m4v, .dat	MPEG-4 video part 2
.mov	QuickTime Video – any CODEC loaded
.mp4	MPEG-4 part 2 file; then H.264 file
.omf, .omfi	AVID file – any CODEC loaded
.peaq	Video Clarity PEAQ parameters
.pbm	Portable Bitmap
.pcx	Paintbrush Image
.pgm	Portable Gray map
.pic, .pct	Picture Still Image File
.pnm	Portable Any map Still Image
.ppm	Portable Pixel map Still Format
.psd	Photoshop
.psnr	ClearView PSNR parameters
.ras	Sun Microsystems Raster
.rgb	Raw RGB image file
.rgba	Raw RGB image with Alpha
.rtv	Video Toaster
.sgi	SGI still image
.spatial	ClearView SPATIAL parameters
.sun	Sun Raster Image
.temporal	ClearView TEMPORAL parameters
.tga	Targa Still
.tiff	Tagged Image Format
.vda	TGA Image Variant
.vst	Targa Vista Image Format
.xmb, .xpm	X Windows
.yuv	Raw YUV image
.yuv10	Raw YUV 10-bit format

After the file is imported in to the application, File Importer populates all the required information and sets default adjustment configuration for Source Modification and Output Sequence sections.

Custom Filters

File Importer has the ability to allow the user to use different decoders than the ones provided for audio and video. This is done through creating/modifying a file named CustomFiltersList.xml that needs to be place in the File Importer directory.

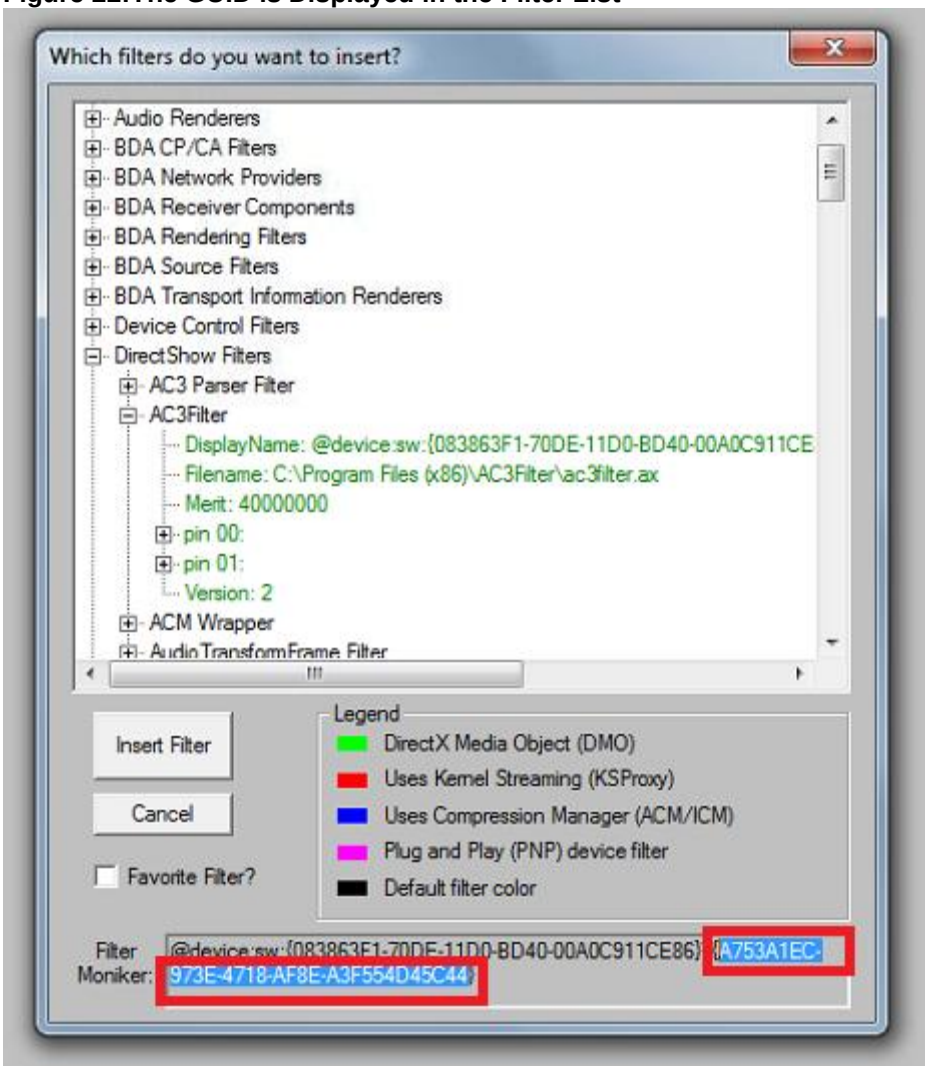
Listing 1: XML File Contents

```
<fileimporter>
	<filtertype>
		<type>videodecoder</type>
		<filter>
			<name>VideoDecoderSample</name>
			<guid>{47228545-02D3-483C-99DB-F86EE45725F4}</guid>
		</filter>
	</filtertype>
	<filtertype>
		<type>audiodecoder</type>
		<filter>
			<name>AudioDecoderSample</name>
			<guid>{A753A1EC-973E-4718-AF8E-A3F554D45C44}</guid>
		</filter>
	</filtertype>
</fileimporter>
```

The structure uses the tags *fileimporter* to contain the entire list and the tag *filtertype* to contain the new decoder to be used. The *type* can be either *videodecoder* or *audiodecoder*. Within the *filter* tag is the information about the decoder. The *name* tag will be what is displayed in File Importer and the *guid* tag is taken from the graphedit program.

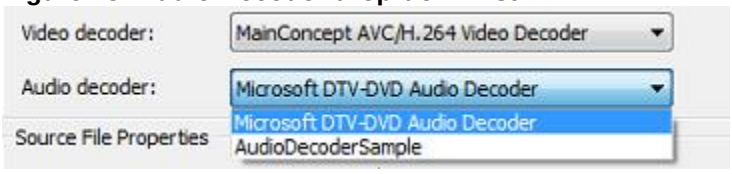
Using the Graph Edit tool you need to select “Graphs”-> “Insert Filters”, which will bring up a filters list. Looking through the list for “DirectShow Filters” and expand it (your filter may be under a different area). In this expanded list look for the filter that you will use (in this case it was AC3Filter). Click on the filter to have information displayed in the “Filter Moniker” text box. The guid is the second set of numbers which need to be added to the xml file.

Figure 22:The GUID is Displayed in the Filter List



Once the file is saved to the correct location and the next time File Importer is opened, the new decoder will appear. Below is how the audio decoder shown in the above xml file would appear in File Importer.

Figure 23: Audio Decoder drop-down list

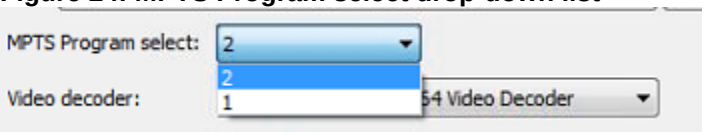


MPTS Program Select

File Importer allows video files with more than one stream to be imported and used for decoding purposes. In case transport stream offers more than one program service, expanded drop-down list will reflect all program services that imported video file contains.

In case loaded file offers single program transport stream – the list will contain only default ‘0’ value.
In order to navigate through available program streams, expand ‘MPTS Program Select’ drop-down list and select desired Program ID (PID) Hexadecimal value for decoding.

Figure 24: MPTS Program select drop-down list



After the MPTS Program is selected, File Importer will reload and populate Source File Properties section, since various streams may contain different source information.

De-Interlace Imported Video

File Importer provides ability to De-Interlace video files and decode them according to the Output Sequence options specified.

The De-Interlace checkbox will not be automatically checked for converting from interlaced to progressive video, so the user must check the box manually if they wish to De-Interlace the sequence.

When File Importer de-interlaces a progressive frame of video it combines the lines of field one and the lines of field two into single progressive frame. No interpolation or content modification takes place whatsoever.

Rate Change

Similar to De-Interlacing, File Importer application dynamically adjusts to the imported video file’s properties and output video format specified. In case the imported video source properties differ from the specified Video Format, ‘Rate Change’ checkbox will need to be manually checked by the user in order for frame change to occur.

Also, selecting Video Format, which has no rate change comparing to the source file’s properties will cause ‘Rate Change’ to remain unchecked (if previously not checked), or unchecked (if previously checked).

When File Importer performs a frame-rate conversion frames are either dropped or repeated. There is no inter-frame prediction or content manipulation.

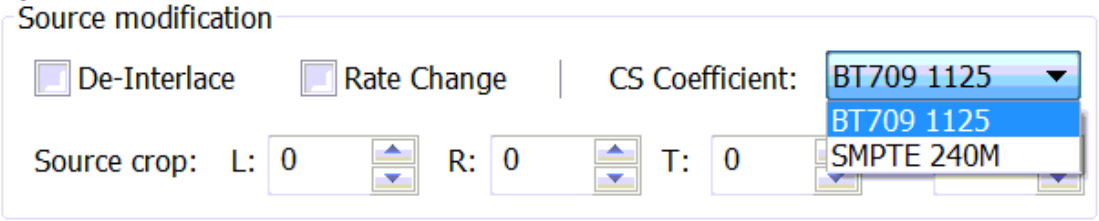
CS Coefficient

It is possible to change Color Space Coefficient that will be applied for the source file during the decoding process.

File Importer offers the following CS Coefficients in the Source Modification section:

- BT709 1125
- SMPTE 240M

Figure 25: CS Coefficient selection



Source Crop

File Importer source cropping functionality provides the ability to define the area of the imported video to be used in decoding process.

Source cropping is defined in the 'Source Modification' section - 'Source Crop' adjustable fields.

The following options are available:

- **L** (Left)
- **R** (Right)
- **T** (Top)
- **B** (Bottom)

Source cropping definition is done in pixels.

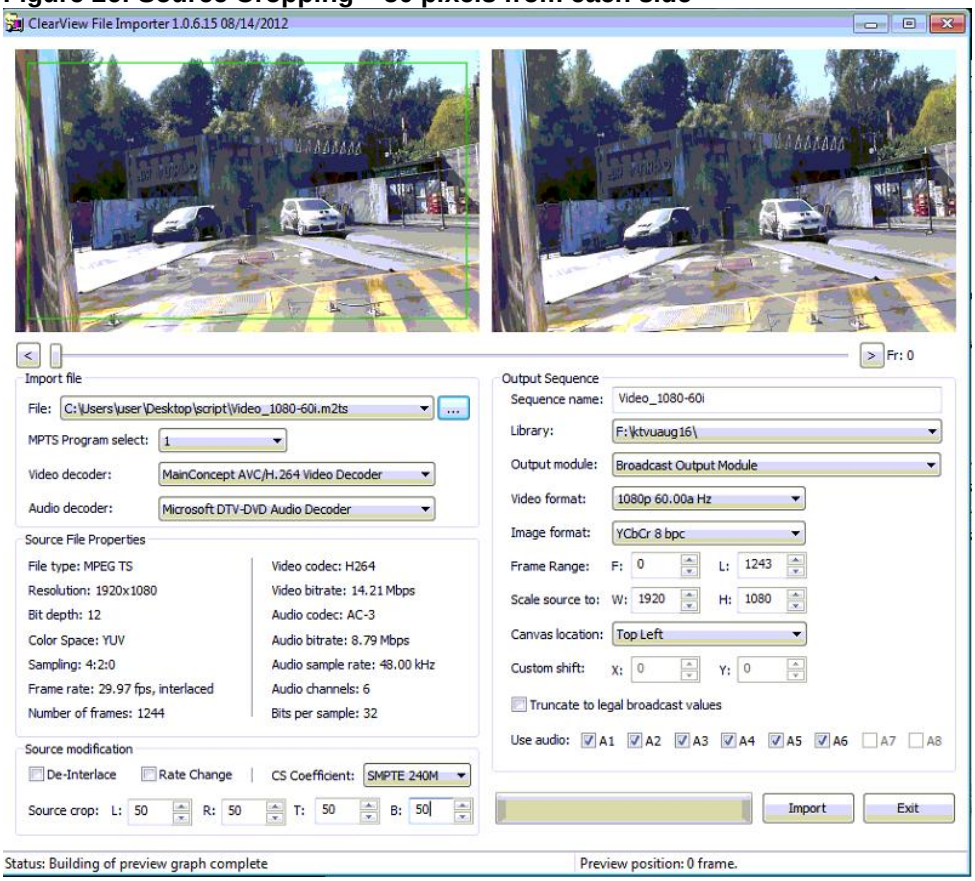
Adjustable fields allow only numeric input. Being left blank, behave, as it was '0' input specified.

Values, entered in the 'Source Crop' adjustable fields mean the amount of pixels to be cropped from the original imported video.

Once the value is entered in any of the fields, green line will be displayed on the Input Video Preview screen, displaying the part of the source video, which will be cut.

Output Video Preview screen dynamically adjusts to the source cropping and displays the possible decoding result, according to other 'Output Sequence' options specified.

Figure 26: Source Cropping – 50 pixels from each side


ClearView File Importer 1.0.6.15 08/14/2012
Import file
File: C:\Users\user\Desktop\script\Video_1080-60i.m2ts
MPTS Program select: 1
Video decoder: MainConcept AVC/H.264 Video Decoder
Audio decoder: Microsoft DTV-DVD Audio Decoder
Source File Properties
File type: MPEG TS
Resolution: 1920x1080
Bit depth: 12
Color Space: YUV
Sampling: 4:2:0
Frame rate: 29.97 fps, interlaced
Number of frames: 1244
Video codec: H264
Video bitrate: 14.21 Mbps
Audio codec: AC-3
Audio bitrate: 8.79 Mbps
Audio sample rate: 48.00 kHz
Audio channels: 6
Bits per sample: 32
Source modification
De-Interlace
Rate Change
CS Coefficient: SMPTE 240M
Source crop: L: 50 R: 50 T: 50 B: 50
Output Sequence
Sequence name: Video_1080-60i
Library: F:\ktvuaug16\
Output module: Broadcast Output Module
Video format: 1080p 60.00a Hz
Image format: YCbCr 8 bpc
Frame Range: F: 0 L: 1243
Scale source to: W: 1920 H: 1080
Canvas location: Top Left
Custom shift: X: 0 Y: 0
Truncate to legal broadcast values
Use audio: A1 A2 A3 A4 A5 A6 A7 A8
Import
Exit
Fr: 0
Status: Building of preview graph complete
Preview position: 0 frame.

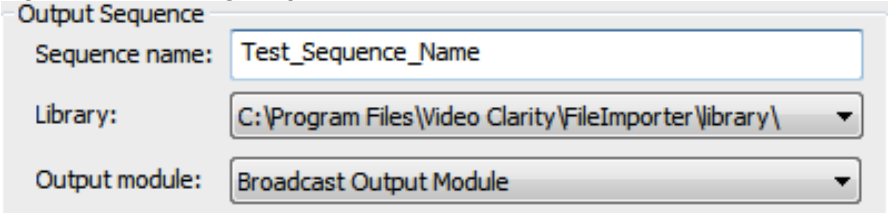
Sequence name

'Sequence Name' field identifies the file name that will be used for the decoding output. The field allows alphanumerical input with special characters.

After the decoding process is completed with certain 'Sequence Name' value specified, the following files will be created with provided input:

- **<Sequence Name> (with no extension)** – Decoded Video raw data;
- **<SequenceName>.aud** – Decoded Audio raw data;
- **<SequenceName>.cvo** - The file contains the name of the sequence.

Figure 27: Defining Sequence Name



Library

As it was already stated before, 'Library' identifies the location of the output files after the decoding process is completed.

'Library' drop-down list contains all available Libraries, created in ClearView application.

Note: *Please refer to the 4.1.1 section for the information on how to define new Libraries in ClearView application.*

In order to select certain 'Library' it is needed to expand corresponding drop-down list and click on the desired path.

Once the decoding is completed for specific imported video, output files will be stored on the location, selected as 'Library'.

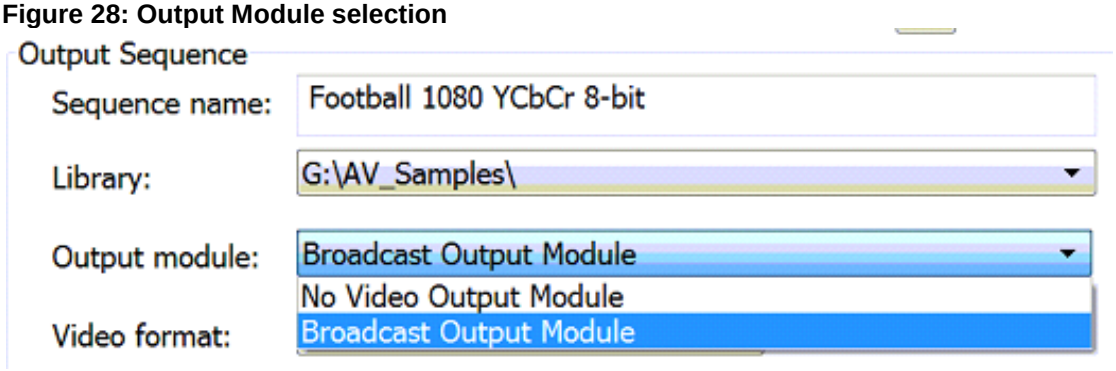
Note: *Output audio files' location may differ. Please refer to the 4.1.2 section for more information about audio files' allocation.*

Output Module

'Output Module' holds the list of the modules, that may be selected for video decoding.
By default, File Importer contains the following modules:

- No Video Output Module
- Broadcast Output Module

Figure 28: Output Module selection



To select the 'Output module', expand corresponding drop-down list and click on the specific module that will be used for video decoding purposes.

'No Video Output Module' has no restrictions on the video format. The user may add desired video formats.

Note: *Please refer to the 3.1.3 section for the information on how to add specific resolution and frame rate for 'No Video Output Module'.*

'Broadcast Output Module' includes the set of resolutions and their frame rates, used by in-video devices.

Video Format

Video Format selection identifies resolution and frame rate in which the video will be decoded.
According to 'Output Module' selected, 'Video Format' may hold two different sets of output resolutions.

Table 6: Output Format

Output Format	
No Video Output Module	**Broadcast Output Module**
720 x 486 30 Hz;	525 59.94 Hz;
720 x 526 25 Hz;	625 50.00 Hz;
1280 x 720 25 Hz;	720p 50.00 Hz;
1280 x 720 30 Hz;	720p 59.94 Hz;
1280 x 720 50 Hz;	720p 60.00 Hz;
1280 x 720 60 Hz;	1080i 50.00 Hz;
1920 x 1080 25 Hz;	1080i 59.94 Hz;
1920 x 1080 30 Hz;	1080i 60.00 Hz;
1920 x 1080 50 Hz;	1080p 23.98 Hz;
1920 x 1080 60 Hz	1080p 24.00 Hz;
**Any Custom Format	1080p 25.00 Hz;
	1080p 29.97 Hz;
	1080p 30.00 Hz;
	1080p 50.00a Hz;
	1080p 59.94a Hz;
	1080p 60.00a Hz;
	1080p 50.00b Hz;
	1080p 58.94b Hz;
	1080p 60.00b Hz;
	1080psf 23.98 Hz;
	1080psf 24.00 Hz

Additionally, user-defined resolutions and refresh rates may be configured in ClearView's main application.

Note: *Please refer to the 4.1.3 section for the information on how to add specific resolution and frame rate for 'No Video Output Module'.*

In order to select certain 'Video Format', please specify 'Output Module' first.
Having the 'Output Module' selected, expand 'Video Format' drop down-list and click on the resolution you would like to have the video decoded in.

Figure 29: Available Video Format options for Broadcast Output Module

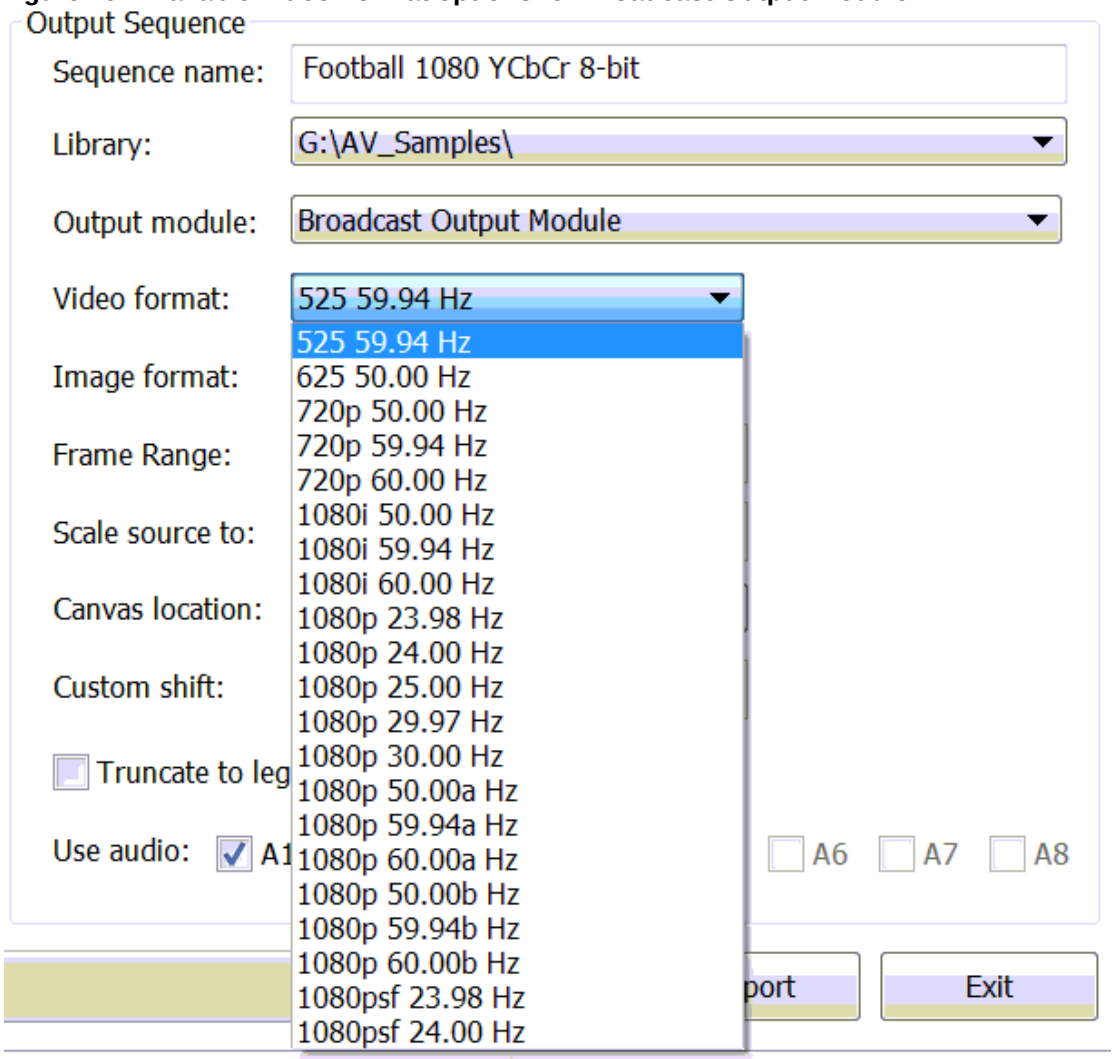
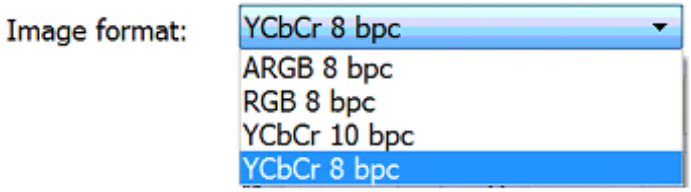


Image Format

File Importer allows applying certain Image Format to be used in output video sequence. Offered 'Image Formats' are:

- **Y'CbCr 8 bpc** – Broadcast I/O format
- **Y'CbCr 10 bpc** – Broadcast I/O format
- **ARGB 8 bpc** – DVI I/O format

Figure 30: Image Format selection



In order to select the desired Image Format, please expand corresponding drop-down list and click on the value you would like to be applied for the decoded video.

Frame Range

'Frame Range' adjustable fields identify the range of the imported video file to be used for the decoding process.
The following fields are available for 'Frame Range' adjusting:

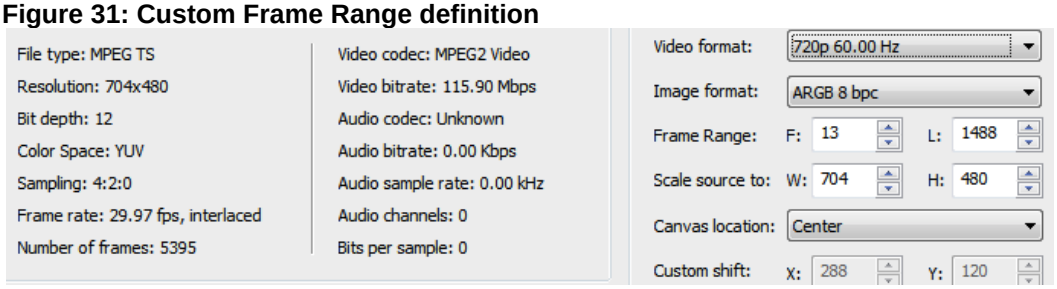
- **F (First)** – Number of the first frame to be used;
- **L (Last)** – Number of the last frame to be used in video decoding process.

By default, once the video is imported, 'Frame Range' adjustable fields are updated to hold the whole amount of frames of the video.

Note: *The first frame of the video sequence always starts with '0' value.*

'Frame Range' adjustable fields allow only numeric values to be input. Number of the last frame cannot be greater than it is defined for the first one.

Figure 31: Custom Frame Range definition


File type: MPEG TS
Resolution: 704x480
Bit depth: 12
Color Space: YUV
Sampling: 4:2:0
Frame rate: 29.97 fps, interlaced
Number of frames: 5395
Video codec: MPEG2 Video
Video bitrate: 115.90 Mbps
Audio codec: Unknown
Audio bitrate: 0.00 Kbps
Audio sample rate: 0.00 kHz
Audio channels: 0
Bits per sample: 0
Video format: 720p 60.00 Hz
Image format: ARGB 8 bpc
Frame Range: F: 13 L: 1488
Scale source to: W: 704 H: 480
Canvas location: Center
Custom shift: X: 288 Y: 120

Scale Source to

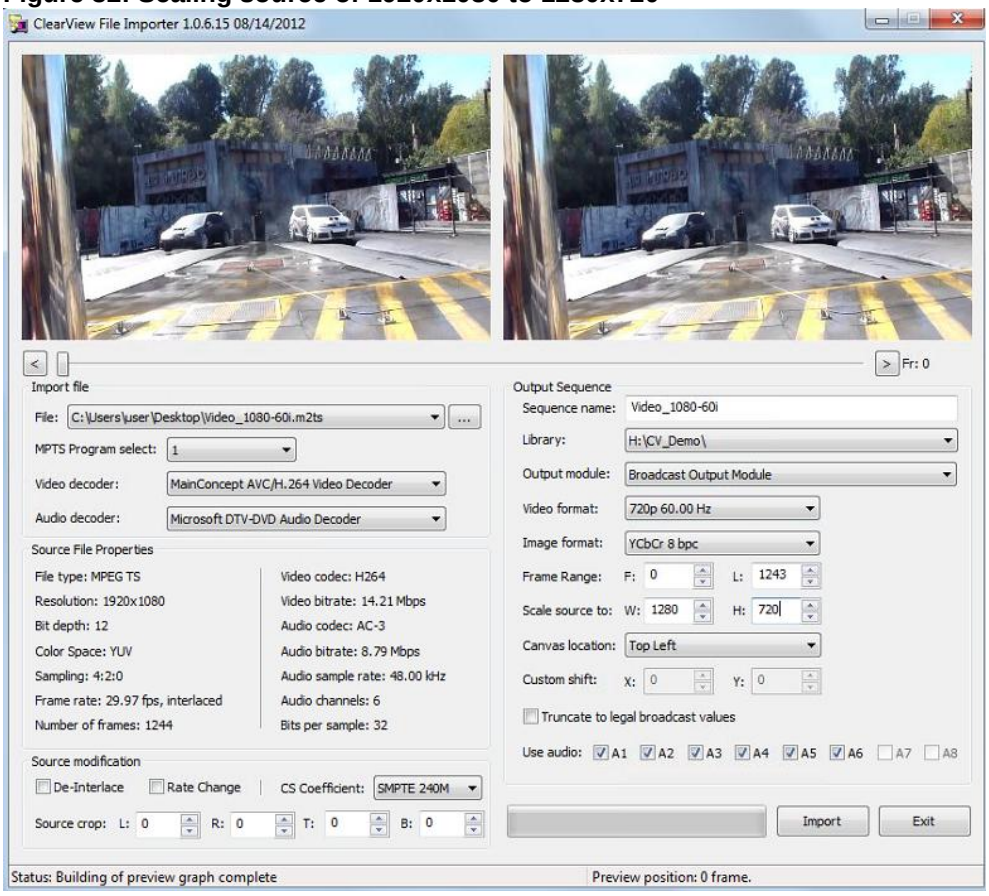
File Importer scaling functionality provides the ability to scale source video file upon per-pixel width and height adjustment within selected output Video Format.
'Scale Source to' adjustable fields offer the following definitions:

- **W (Width) –** per-pixel width scaling of the source file;
- **H (Height) –** per-pixel height scaling of the source file.

In order to configure source scaling, it is required to provide numerical input in to both 'Scale Source to' adjustable fields.

For scaling File Importer uses a 4 to 8 tap filter in the horizontal direction and a 4 tap filter in the vertical direction, where it will give a weight to each pixel being used to determine the new pixel's value. The resulting pixel will be calculated from the 16 to 32 pixels using weighted values depending on the scaling factors. Scaling does modify the video content.

Figure 32: Scaling source of 1920x1080 to 1280x720


ClearView File Importer 1.0.6.15 08/14/2012
Import file
File: C:\Users\user\Desktop\Video_1080-60i.m2ts
MPTS Program select: 1
Video decoder: MainConcept AVC/H.264 Video Decoder
Audio decoder: Microsoft DTV-DVD Audio Decoder
Source File Properties
File type: MPEG TS
Resolution: 1920x1080
Bit depth: 12
Color Space: YUV
Sampling: 4:2:0
Frame rate: 29.97 fps, interlaced
Number of frames: 1244
Video codec: H264
Video bitrate: 14.21 Mbps
Audio codec: AC-3
Audio bitrate: 8.79 Mbps
Audio sample rate: 48.00 kHz
Audio channels: 6
Bits per sample: 32
Source modification
De-Interlace
Rate Change
CS Coefficient: SMPTE 240M
Source crop: L: 0 R: 0 T: 0 B: 0
Output Sequence
Sequence name: Video_1080-60i
Library: H:\CV_Demo\
Output module: Broadcast Output Module
Video format: 720p 60.00 Hz
Image format: YCbCr 8 bpc
Frame Range: F: 0 L: 1243
Scale source to: W: 1280 H: 720
Canvas location: Top Left
Custom shift: X: 0 Y: 0
Truncate to legal broadcast values
Use audio: A1 A2 A3 A4 A5 A6 A7 A8
Import
Exit
Status: Building of preview graph complete
Preview position: 0 frame.

By default, the fields are updated with the resolution of the imported video file.

Note: *Scaling resolution may not be greater than two times of the selected 'Video Format', meaning that for 720p output resolution, maximum scaling definition is 1560x1440 pixels.*

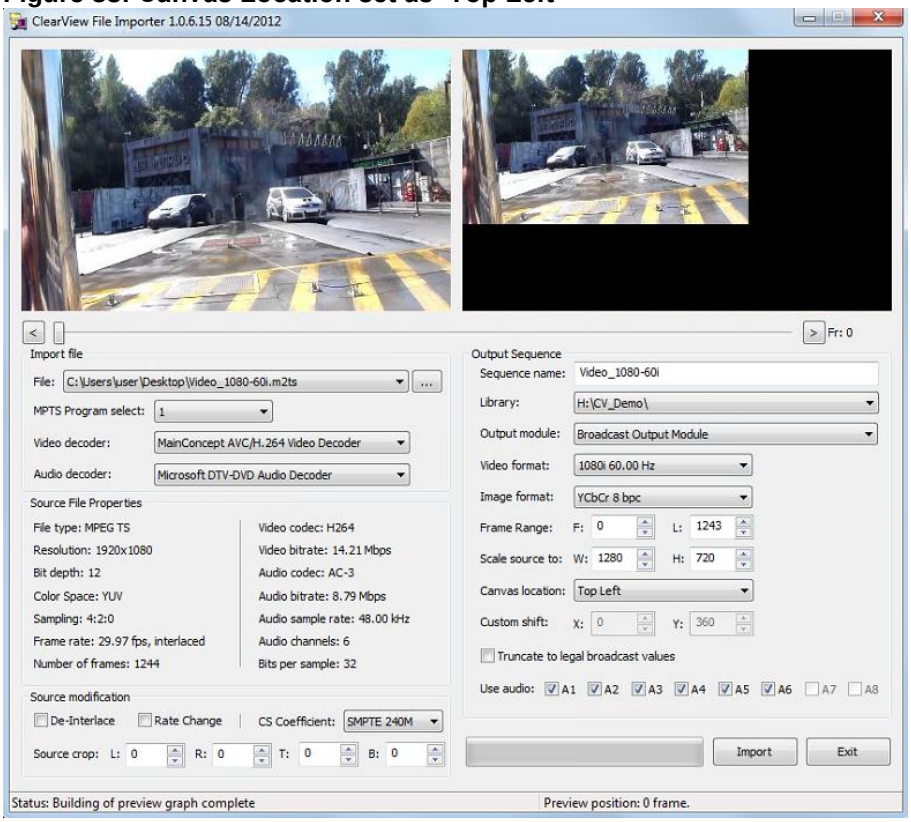
Canvas Location

'Canvas Location' identifies the location of the video to be placed on the screen, in case black padding is displayed, or the video resolution exceeds 'Video Format' specified.
Following selections are available for 'Canvas Location' configuration:

- **Center** (Video will be displayed in the center);
- **Top Left** (Video will be displayed in the top left corner);
- **Top Right** (Video will be displayed in the top right corner);
- **Bottom Left** (Video will be displayed in the bottom left corner);
- **Bottom Right** (Video will be displayed in the bottom right corner);
- **Use Custom Shift Values** (if selected, user will be able to specify custom shift)

In order to define 'Canvas Location', please expand corresponding drop-down list in Output Sequence section and select desired output video location.

Figure 33: Canvas Location set as 'Top Left'


ClearView File Importer 1.0.6.15 08/14/2012
Import file
File: C:\Users\user\Desktop\Video_1080-60i.m2ts
MPTS Program select: 1
Video decoder: MainConcept AVC/H.264 Video Decoder
Audio decoder: Microsoft DTV-DVD Audio Decoder
Source File Properties
File type: MPEG TS
Resolution: 1920x1080
Bit depth: 12
Color Space: YUV
Sampling: 4:2:0
Frame rate: 29.97 fps, interlaced
Number of frames: 1244
Video codec: H264
Video bitrate: 14.21 Mbps
Audio codec: AC-3
Audio bitrate: 8.79 Mbps
Audio sample rate: 48.00 kHz
Audio channels: 6
Bits per sample: 32
Source modification
De-Interlace
Rate Change
CS Coefficient: SMPTE 240M
Source crop: L: 0 R: 0 T: 0 B: 0
Fr: 0
Output Sequence
Sequence name: Video_1080-60i
Library: H:\CV_Demo\
Output module: Broadcast Output Module
Video format: 1080i 60.00 Hz
Image format: YCbCr 8 bpc
Frame Range: F: 0 L: 1243
Scale source to: W: 1280 H: 720
Canvas location: Top Left
Custom shift: X: 0 Y: 360
Truncate to legal broadcast values
Use audio: A1 A2 A3 A4 A5 A6 A7 A8
Import
Exit
Status: Building of preview graph complete
Preview position: 0 frame.

Note: *'Use Custom Shift Values' option allows defining user-specified shifting. This functionality is described in 6.1.16 section.*

Custom Shift

By default, 'Custom Shift' adjustable fields are disabled for editing and display the values of current video positioning on the screen according to output Video Format specified.

In order to enable 'Custom Shift' it is required to select 'Use Custom Shift Values' in the 'Canvas Location' drop-down list.

Custom shifting provides the ability to define user-input positioning for the output video in case the black padding appears on the screen, or the video exceeds configured resolution.

Following adjustable fields are available for video shifting configuration:

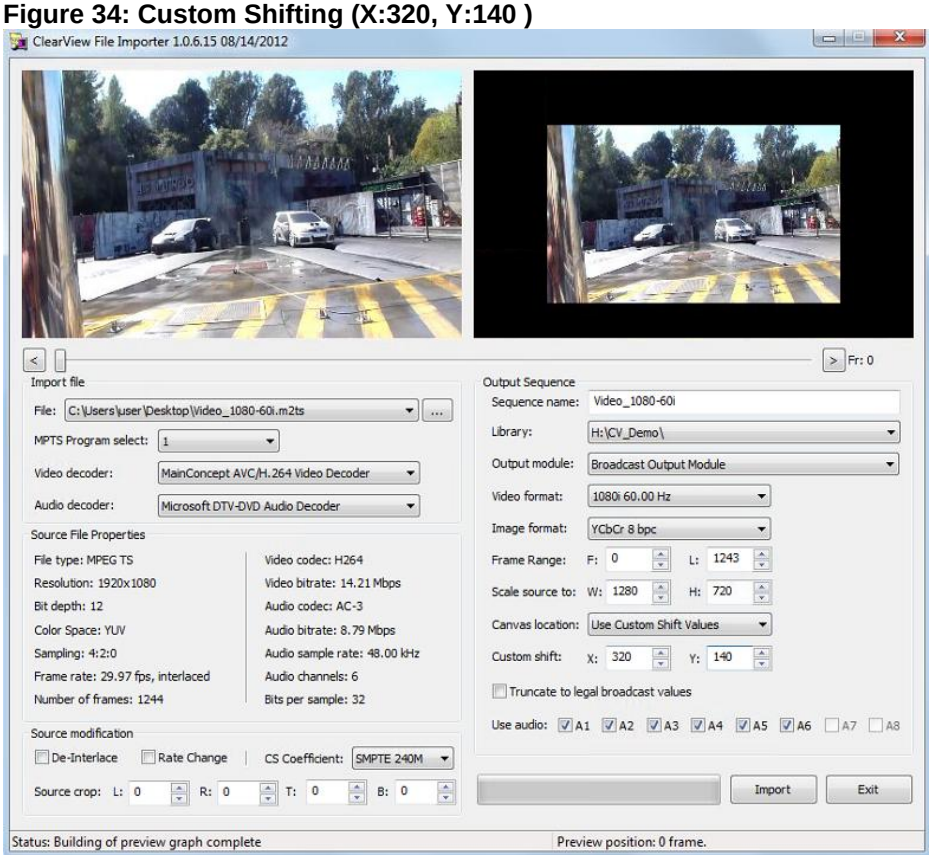
- **X** (X-axis shifting);
- **Y** (Y-axis shifting)

Adjustable fields accept numeric input (both positive and negative).
To configure custom shifting, please input:

- The value in X field that identifies per-pixel shifting from bottom left to top left corner;

- The value in Y field that defines per-pixel shifting from bottom left to bottom right corner.

Figure 34: Custom Shifting (X:320, Y:140)


ClearView File Importer 1.0.6.15 08/14/2012
Import file
File: C:\Users\user\Desktop\Video_1080-60i.m2ts
MPTS Program select: 1
Video decoder: MainConcept AVC/H.264 Video Decoder
Audio decoder: Microsoft DTV-DVD Audio Decoder
Source File Properties
File type: MPEG TS
Resolution: 1920x1080
Bit depth: 12
Color Space: YUV
Sampling: 4:2:0
Frame rate: 29.97 fps, interlaced
Number of frames: 1244
Video codec: H264
Video bitrate: 14.21 Mbps
Audio codec: AC-3
Audio bitrate: 8.79 Mbps
Audio sample rate: 48.00 kHz
Audio channels: 6
Bits per sample: 32
Source modification
De-Interlace
Rate Change
CS Coefficient: SMPTE 240M
Source crop: L: 0 R: 0 T: 0 B: 0
Output Sequence
Sequence name: Video_1080-60i
Library: H:\CV_Demo\
Output module: Broadcast Output Module
Video format: 1080i 60.00 Hz
Image format: YCbCr 8 bpc
Frame Range: F: 0 L: 1243
Scale source to: W: 1280 H: 720
Canvas location: Use Custom Shift Values
Custom shift: X: 320 Y: 140
Truncate to legal broadcast values
Use audio: A1 A2 A3 A4 A5 A6 A7 A8
Import
Exit
Fr: 0
Status: Building of preview graph complete
Preview position: 0 frame.

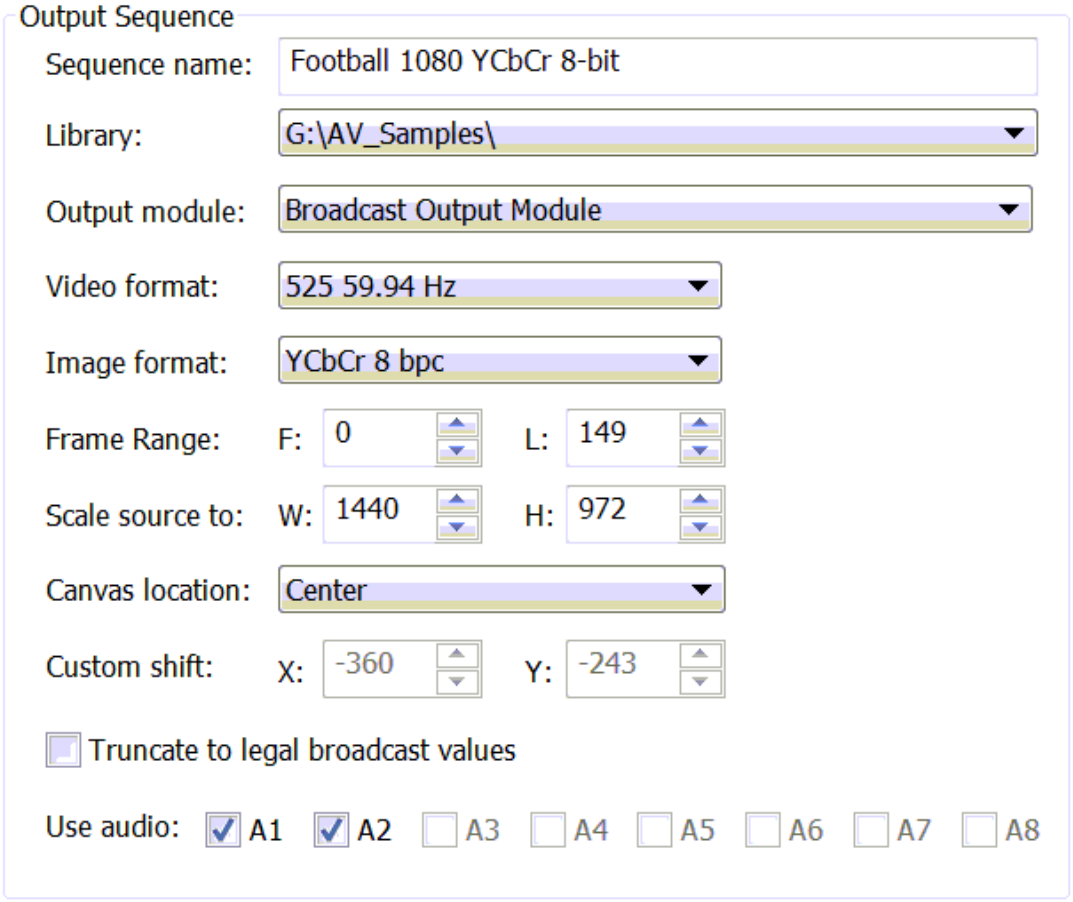
Truncate to Legal Broadcast Values

'Truncate to Legal Broadcast Values' functionality is used in YUV Luma only.

Pixel intensity values for the Y Component that are above or below the following values should be truncated to only values within this range.

In order to apply truncating, please check the corresponding checkbox before decoding the video.

Figure 35: Truncate to legal broadcast values' checkbox checked



Use Audio

File Importer provides the ability of video decoding with up-to 8 audio channels.

Once the video file is imported, application loads and automatically selects all available audio channels. Unavailable audio channels will be displayed as grayed out checkboxes.

Figure 36: 2 Audio Channels available, A2 selected

In order to select/deselect audio channels that will be available in the output video sequence, simply check/uncheck corresponding checkboxes in the 'Use Audio' section.

Using Per-Frame Slider

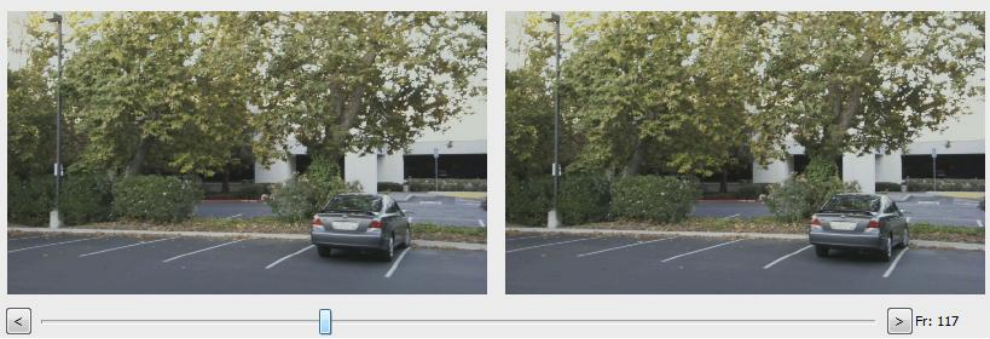
Per-Frame Slider is located under the Video Preview section and allows navigating through the frames of the source video.

By default, slider is located on the first frame of the imported video.

Note: *The first frame of the video sequence always starts with '0' value.*

Sliding through the source video file immediately displays the selected input frame in the Input Video Preview screen and maintained (adjusted) frame in the Output Video Preview screen.

Figure 37: Per-Frame Slider placed on 117th frame



In order to use per-frame sliding, you may use arrows on the left and right sides of the slider, or put the focus anywhere on the sliding scale.

Additionally, with the focus put on the sliding scale, it is possible to navigate using keyboard arrows.

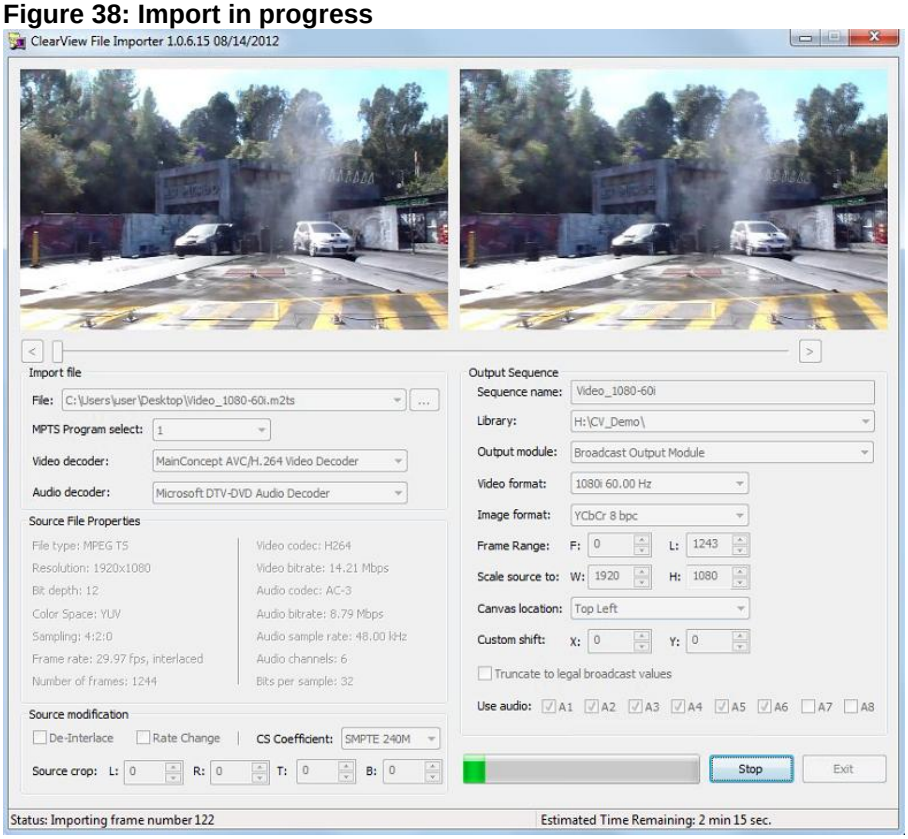
Current number of the frame is displayed as ‘Fr:’ next to the right slider arrow.

Importing Video

After all the desired adjustments made to the source input, it is possible to ‘Import’ (decode) the video file. In order to do that, simply click on ‘Import’ button in the bottom right corner of the File Importer screen. Once ‘Import’ action is initiated, ‘Progress’ bar will indicate the current progress of the decoding process.

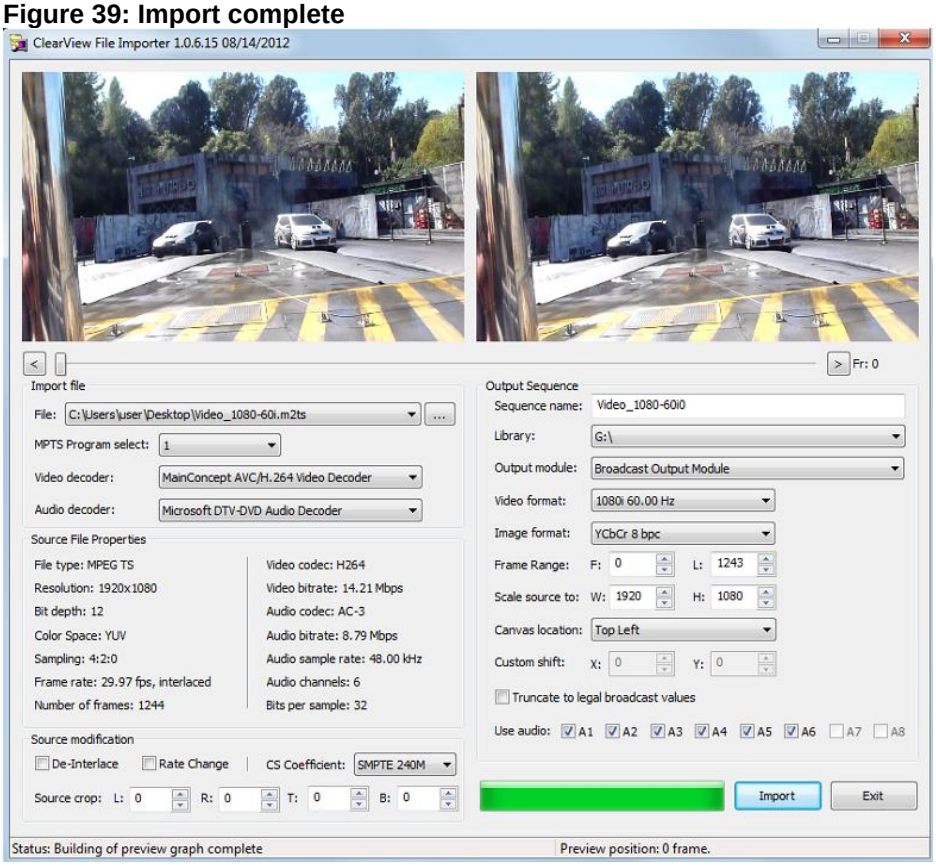
‘Status’ bar in the bottom right corner indicates the current frame, which is being decoded.
‘Information’ bar displays approximate amount of time that has left to finish the decoding process.

Figure 38: Import in progress


ClearView File Importer 1.0.6.15 08/14/2012
Import file
File: C:\Users\user\Desktop\Video_1080-60i.m2ts
MPTS Program select: 1
Video decoder: MainConcept AVC/H.264 Video Decoder
Audio decoder: Microsoft DTV-DVD Audio Decoder
Source File Properties
File type: MPEG TS
Resolution: 1920x1080
Bit depth: 12
Color Space: YUV
Sampling: 4:2:0
Frame rate: 29.97 fps, interlaced
Number of frames: 1244
Video codec: H264
Video bitrate: 14.21 Mbps
Audio codec: AC-3
Audio bitrate: 8.79 Mbps
Audio sample rate: 48.00 kHz
Audio channels: 6
Bits per sample: 32
Source modification
De-Interlace
Rate Change
CS Coefficient: SMPTE 240M
Source crop: L: 0 R: 0 T: 0 B: 0
Output Sequence
Sequence name: Video_1080-60i
Library: H:\CV_Demo\
Output module: Broadcast Output Module
Video format: 1080i 60.00 Hz
Image format: YCbCr 8 bpc
Frame Range: F: 0 L: 1243
Scale source to: W: 1920 H: 1080
Canvas location: Top Left
Custom shift: X: 0 Y: 0
Truncate to legal broadcast values
Use audio: A1 A2 A3 A4 A5 A6 A7 A8
Stop
Exit
Status: Importing frame number 122
Estimated Time Remaining: 2 min 15 sec.

After the ‘Import’ has completed, ‘Progress’ bar will turn to solid-green and ‘Status’ bar will hold ‘Import file complete’ message.

Figure 39: Import complete


ClearView File Importer 1.0.6.15 08/14/2012
Fr: 0
Import file
File: C:\Users\user\Desktop\Video_1080-60i.m2ts
MPTS Program select: 1
Video decoder: MainConcept AVC/H.264 Video Decoder
Audio decoder: Microsoft DTV-DVD Audio Decoder
Source File Properties
File type: MPEG TS
Resolution: 1920x1080
Bit depth: 12
Color Space: YUV
Sampling: 4:2:0
Frame rate: 29.97 fps, interlaced
Number of frames: 1244
Video codec: H264
Video bitrate: 14.21 Mbps
Audio codec: AC-3
Audio bitrate: 8.79 Mbps
Audio sample rate: 48.00 kHz
Audio channels: 6
Bits per sample: 32
Source modification
De-Interlace
Rate Change
CS Coefficient: SMPTE 240M
Source crop: L: 0 R: 0 T: 0 B: 0
Output Sequence
Sequence name: Video_1080-60i0
Library: G:\
Output module: Broadcast Output Module
Video format: 1080i 60.00 Hz
Image format: YCbCr 8 bpc
Frame Range: F: 0 L: 1243
Scale source to: W: 1920 H: 1080
Canvas location: Top Left
Custom shift: X: 0 Y: 0
Truncate to legal broadcast values
Use audio: A1 A2 A3 A4 A5 A6 A7 A8
Import
Exit
Status: Building of preview graph complete
Preview position: 0 frame.

To start maintenance of the next video file, it is needed to import it from the beginning.

GUI Examples

Example 1

Source:

- Interlaced file;
- MPTS program support;
- Video Format: 704x280 29.97 Hz

Required maintenance for output file:

- MPTS Program – 108;
- De-Interlace;
- Change Rate;
- CS Coefficient change – SMPTE 240M
- Library:

'C:\Program Files\Video Clarity\FileImporter\Library\'

- Video Format – 720p 60.00 Hz;
- Canvas Location – Top Right

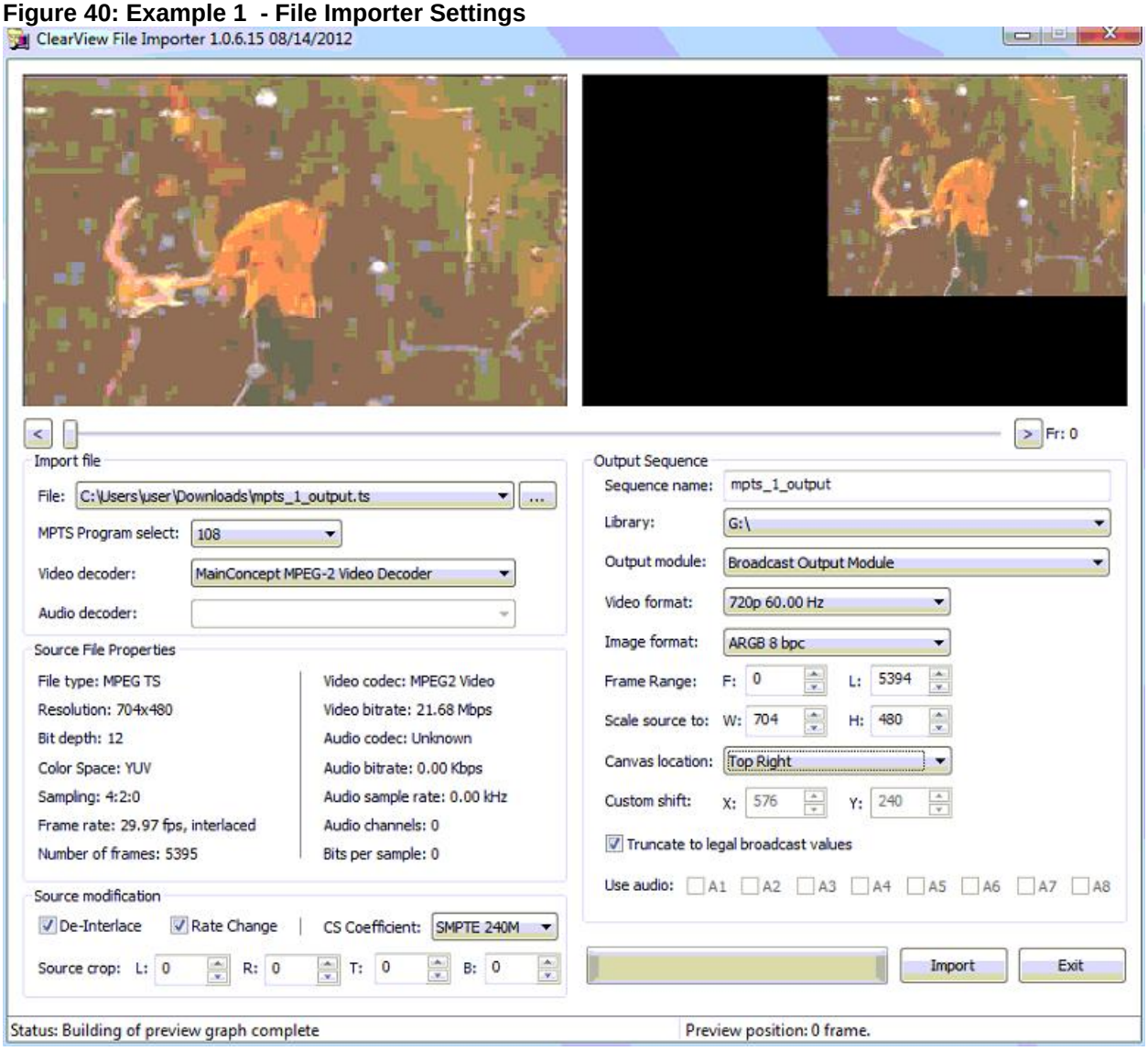
File Importer Settings:

1. Import Source video file
2. Expand 'MPTS Program Select' list and select ***108*** value
3. Select ***SMPTE 240M*** as 'CS Coefficient'.
4. Select 'Library' path: ***'G:\'***
5. Select ***'Broadcast Output Module'*** as 'Output Module';
6. Expand 'Video Format' drop-down list and select ***720p 60.00 Hz***;
7. Set ***Top Right*** value in the 'Canvas Location' drop-down list.
8. Click on 'Import' button.

Note 1: *'De-Interlace' checkbox has been checked automatically, since interlaced source file is converted to Progressive (720p).*

Note 2: *'Rate Change' checkbox has been automatically checked, since frame rate for selected Video Format is greater than source file's.*

Figure 40: Example 1 - File Importer Settings



Example 2

Source:
- Interlaced file;
- MPTS program support;
- Video Format: 704x280 29.97Hz

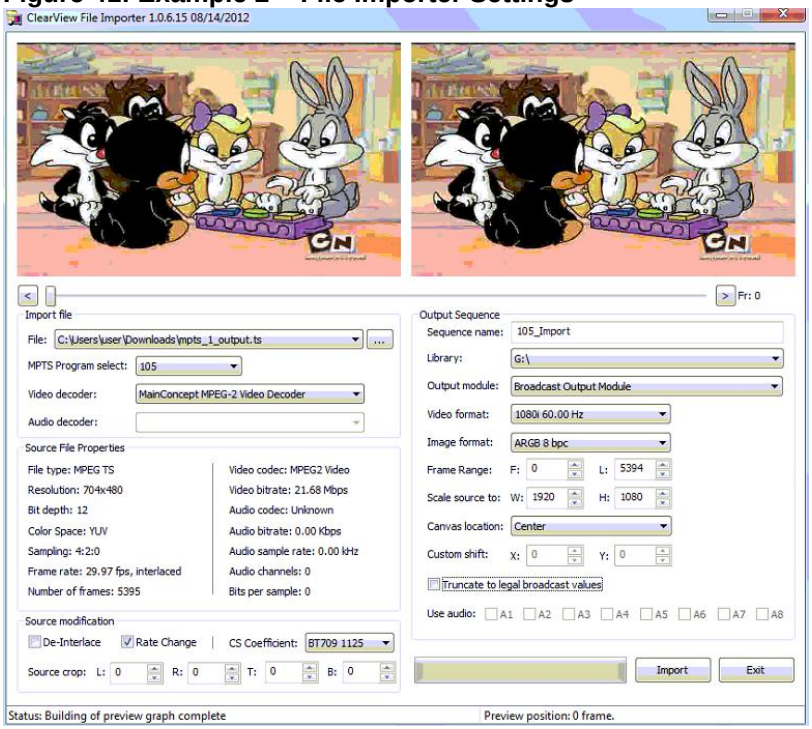
Required maintenance for output file:
- MPTS Program – 105;
- Change Rate;
- Sequence Name: 105_Import;
- Library:

'C:\Program Files\Video Clarity\FileImporter\Library\'
- Video Format – 1080i 60.00 Hz;
- Scale Source to – 1920x1080;
- Canvas Location – Center.

File Importer Settings:
1. Import Source video file;
2. Expand 'MPTS Program Select' list and select ***105*** value;
3. Define ***105_Import*** as 'Sequence Name';
4. Select 'Library' path: ***'G:\'***
5. Select ***'Broadcast Output Module'*** as 'Output Module';
6. Expand 'Video Format' drop-down list and select ***1080i 60.00 Hz****;*
7. Set 'Scale Source to' as ***W:1920***, ***H:1080***;
8. Set ***Center*** value in the 'Canvas Location' drop-down list.
9. Click on 'Import' button.

Note 1: *'Rate Change' checkbox has been automatically checked, since frame rate for selected Video Format is greater than the source file's.*

Figure 41: Example 2 - File Importer Settings



Example 3

Source:

- Progressive file;
- Video Format: 1280x720 22.21 Hz

Required maintenance for output file:

- Change Rate;
- Source Crop: L:50; R:50; T:20; B:20;
- Library:

'C:\Program Files\Video Clarity\FileImporter\Library\'

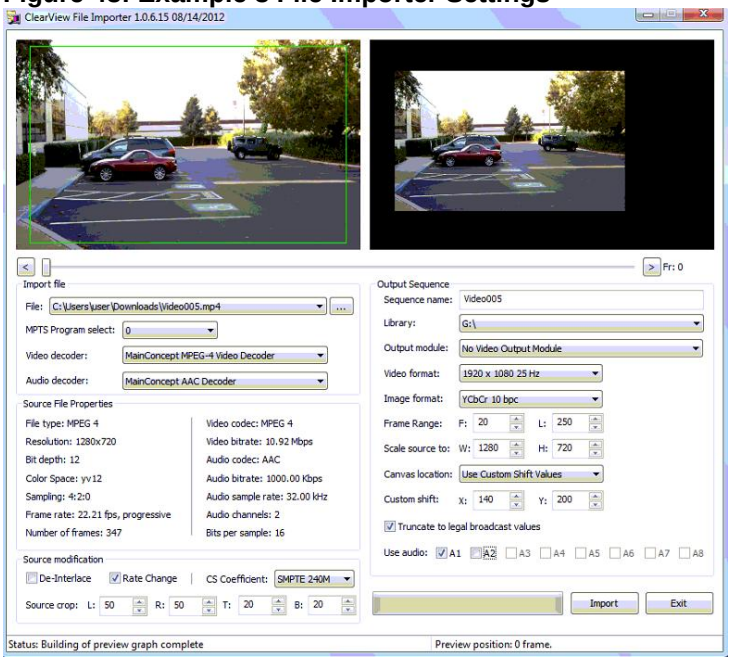
- Output Module – No Video Output Module;
- Video Format – 1920x180 25 Hz;
- Image Format – YCbCr 10 bpc;
- Frame Range – F:20; L:250
- Custom Shift – X:140; Y:200;
- Truncate to legal broadcast values – checked;
- Use Audio: A1

File Importer Settings:

1. Import Source video file;
2. Set Source Crop: ***L:50; R:50; T:20; B:20;***
3. Select 'Library' path: ***'G:\'***
4. Select ***'No Video Output Module'*** as 'Output Module';
5. Expand 'Video Format' drop-down list and select ***1920x180 25 Hz;***
6. Set ***YCbCr 10 bpc*** as 'Image Format';
7. Define ***F:20; L:250*** in 'Frame Range' adjustable fields;
8. Set ***Use Custom Shift Values*** value in the 'Canvas Location' drop-down list.
9. Set Custom Shift as ***X:140; Y:200***;
10. ***Check*** 'Truncate to legal broadcast values' checkbox.
11. ***Uncheck A2*** checkbox in 'Use Audio'.
12. Click on 'Import' button.

Note 1: *'Rate Change' checkbox has been automatically checked, since frame rate for selected Video Format is greater than the source file's.*

Figure 43: Example 3 File Importer Settings


ClearView File Importer 1.0.6.15 08/14/2012
Import file
File: C:\Users\user\Downloads\Video005.mp4
MPTS Program select: 0
Video decoder: MainConcept MPEG-4 Video Decoder
Audio decoder: MainConcept AAC Decoder
Source File Properties
File type: MPEG 4
Resolution: 1280x720
Bit depth: 12
Color Space: yv12
Sampling: 4:2:0
Frame rate: 22.21 fps, progressive
Number of frames: 347
Video codec: MPEG 4
Video bitrate: 10.92 Mbps
Audio codec: AAC
Audio bitrate: 1000.00 Kbps
Audio sample rate: 32.00 kHz
Audio channels: 2
Bits per sample: 16
Source modification
De-Interlace
Rate Change
CS Coefficient: SMPTE 240M
Source crop: L: 50 R: 50 T: 20 B: 20
Output Sequence
Sequence name: Video005
Library: G:\
Output module: No Video Output Module
Video format: 1920 x 1080 25 Hz
Image format: YCbCr 10 bpc
Frame Range: F: 20 L: 250
Scale source to: W: 1280 H: 720
Canvas location: Use Custom Shift Values
Custom shift: X: 140 Y: 200
Truncate to legal broadcast values
Use audio: A1 A2 A3 A4 A5 A6 A7 A8
Import
Exit
Fr: 0
Status: Building of preview graph complete
Preview position: 0 frame.

Command Line interface

ClearView File Importer provides the ability for the video to be decoded using a Command Line input.

All settings, available in Graphical User Interface mode are also configurable with specific input commands using the Command Line Interface.

It is possible to adjust the Source Modification and Output Sequence options for the videos and decode the files behind the scene.

Command Line supports batch video maintenance of the source files located both on the local workstation and on a network location.

Table 7: Command Line Input Commands

Command	Description	Supported value / type	Default Value
"fp"	Input file path	File path	"" (empty)
"pid"	Program ID	Number	"-1" (not specified)
"de"	De-interlace	"0" / "1"	"0"
"chr"	Change frame rate	"0" / "1"	"1"
"pd"	3:2 Pulldown	Not implemented	
"cs"	CS Coefficients	- "BT709 1125" - "SMPTE 240M"	"BT709 1125"
"cl"	Crop left value	Number	"0"
"cr"	Crop right value	Number	"0"
"ct"	Crop top value	Number	"0"
"cb"	Crop bottom value	Number	"0"
"sn"	Sequence name	Name	"" (empty)
"lp"	library path	Folder path	
"om"	Output Module	- "No Video Output Module" - "Broadcast Output Module"	"Broadcast Output Module"
"vf"	Video format	**Broadcast Output Module:** - "525 59.94 Hz" - "625 50.00 Hz" - "720p 50.00 Hz" - "720p 59.94 Hz" - "720p 60.00 Hz" - "1080i 50.00 Hz" - "1080i 59.94 Hz" - "1080i 60.00 Hz" - "1080p 23.98 Hz" - "1080p 24.00 Hz" - "1080p 25.00 Hz" - "1080p 29.97 Hz" - "1080p 30.00 Hz" - "1080p 50.00a Hz" - "1080p 59.94a Hz" - "1080p 60.00a Hz" - "1080p 50.00b Hz" - "1080p 59.94b Hz" - "1080p 60.00b Hz" - "1080psf 23.98 Hz" - "1080psf 24.00 Hz" **No Video Output Module:** [width] x [height] [rate] Hz	"525 59.94 Hz"
"if"	Image format	- "YCbCr 8 bpc" - "YCbCr 10 bpc" - "ARGB 8 bpc"	"YCbCr 8 bpc"
"fbf"	Frame Bound First	Number	"0"
"fbl"	Frame Bound Last	Number	"-1" (last one)
"ssw"	Scale Source Width	Number	"-1" (use input width)
"ssh"	Scale Source Height	Number	"-1" (use input height)
"cal"	Canvas Location	- "Center" - "Top Left" - "Top Right" - "Bottom Left" - "Bottom Right" - "Use Custom Shift Values"	"Center"
"shx"	Custom shift x	Number	"0"
"shy"	Custom shift y	Number	"0"

"tr"	Truncate to legal broadcast values	"0" / "1"	"0"
"a1"	Use audio 1	"0" / "1"	"0"
"a2"	Use audio 2	"0" / "1"	"0"
"a3"	Use audio 3	"0" / "1"	"0"
"a4"	Use audio 4	"0" / "1"	"0"
"a5"	Use audio 5	"0" / "1"	"0"
"a6"	Use audio 6	"0" / "1"	"0"
"a7"	Use audio 7	"0" / "1"	"0"
"a8"	Use audio 8	"0" / "1"	"0"
"ualp"	Use audio library path	"0" / "1"	"0"
"alp"	Audio library path	Folder path	"" (empty)
"dbg"	Debug mode	"0" / "1"	"0"
“adec”	Audio decoder name to be used	Name of audio decoder as is displayed in File Importer	“” (empty)
“vdec”	Video decoder name to be used	Name of video decoder as is displayed in File Importer	“” (empty)
“isn”	Select name of sequence when importing off of a ClearView sequence file	Name	“” (empty)

Command Line Examples

Example 1

Source:
- Interlaced file;
- MPTS program support;
- Video Format: 704x280 29.97 Hz

Required maintenance for output file:
- MPTS Program – 108;
- De-Interlace;
- Change Rate;
- CS Coefficient change – SMPTE 240M
- Library:

‘C:\Program Files\Video Clarity\FileImporter\Library\’
- Video Format – 720p 60.00 Hz;
- Canvas Location – Top Right

Command Line input:

-fp "F:\\video\\Video005.mp4" -pid “108” -lp "C:\\Program Files\\Video Clarity\\FileImporter\\Library\\" -cal " Top Right " -cs " SMPTE 240M " -dbg 1 -om "Broadcast Output Module" -vf "720p 60.00 Hz" -de 1 -chr 1

Example 2

Source:
- Interlaced file;
- MPTS program support;
- Video Format: 704x280 29.97Hz

Required maintenance for output file:
- MPTS Program – 105;
- Change Rate;
- Sequence Name: 105_Import;
- Library:

'C:\Program Files\Video Clarity\FileImporter\Library\'
- Video Format – 1080i 60.00 Hz;
- Scale Source to – 1920x1080;
- Canvas Location – Center.

Command Line input:

-fp "F:\\video\\Video005.mp4" -pid "105" -sn "105_Import" -lp "C:\\Program Files\\Video Clarity\\FileImporter\\Library\\" -cal " Center " -dbg 1 -om "Broadcast Output Module" -vf "1080i 60.00 Hz" -chr 1 -ssw "1920" -ssh "1080"

Example 3

Source:
- Progressive file;
- Video Format: 1280x720 22.21 Hz

Required maintenance for output file:
- Change Rate;
- Source Crop: L:50; R:50; T:20; B:20;
- Library:

'C:\Program Files\Video Clarity\FileImporter\Library\'
- Output Module – No Video Output Module;
- Video Format – 1920x180 25 Hz;
- Image Format – YCbCr 10 bpc;
- Frame Range – F:20; L:250
- Custom Shift – X:140; Y:200;
- Truncate to legal broadcast values – checked;
- Use Audio: A1

Command Line input:

-fp "F:\\video\\Video005.mp4" -cl "50" -cr "50" -ct "20" -cb "20" -lp "C:\\Program Files\\Video Clarity\\FileImporter\\Library\\" -cal " Use Custom Shift Values " -dbg 1 -om "No Video Output Module" -vf "1920x1080 25 Hz" -if "YcbCr 10 bpc" -chr 1 -fbf "20" -fbl "250" -shx "140" -shy "200" -tr 1 -a1 1

ClearView File Importer Problem Solving

This section reflects potential issues that may be faced during the ClearView File Importer application's execution and possible resolution.

#	Issue	Resolving Suggestion
1.	MPTS-supporting files take more time to be imported, than other file formats.	Since the MPTS-supporting files contain various streams, File Importer has to spend more time, loading particular file. It is related to the Imported files' properties.
2.	Black line appears on the Output Video Preview screen in case 'YCbCr 10 bpc' image format is applied to '720p' video format.	Please set 'Scale Source To' as 'W:1296' in order to resolve the issue.
3.	Some files do not support seeking.	There's no way to resolve this issue.
4.	Video Import has failed.	Try again re-importing the same file. In case the issue is still reproduced, File Importer may not support the source file's format.
5.	Output audio files are not created.	Please check 'Use Audio Root' option in ClearView and whether the Audio channels are selected before importing the video.

File Import tool in ClearView

The ClearView File Import pane is a continued feature used to import/ingest video sequences into ClearView in addition to the ClearView File Importer application, though the ClearView File Importer tool should always be used first. ClearView can open almost any file-based video sequence known to the video industry. While importing the file, ClearView will do the following steps:

- Convert it to the chosen output format,
- Convert it to the chosen image format,
- Store the uncompressed video sequence on the file system or in memory, and
- Update the catalog information about this file.

ClearView not only imports video sequences; it also imports a list of video sequences, loads Objective Metric parameters, and creates a playlist of files already loaded into ClearView. Two ways exist to import files – you can open them using the file import controls or you can drop a file directly onto the desktop (drag & drop).

If audio is turned on using the ClearView Configuration Menu and audio is included within the program wrapper, then ClearView will import the audio as well. Supported program wrappers include:

- MPEG-2 TS – with MPEG-2 Video and MPEG-1 Audio
- AVI
- WMV
- QuickTime
- MPEG-2 PS – with MPEG-2 Video and MPEG-1 Audio

The Audio formats supported are as follows

- MPEG-2 Layer 1
- AAC
- AMR

- WMA
- WAV
- AIFF
- MP3

Note: ClearView deciphers the file based on the file extension. You must use the correct extension. ClearView supports the extensions listed below.

Table 8: Supported File Extensions (also supported by ClearView File Importer)

Extension	File
.264, .h4v	MPEG-4/AVC, H.264 video file
.aac	Advanced Audio Coding,
.afreq	Video Clarity aFreq parameters
.tpeak	Video Clarity aPeak(TruePeak) parameters
.aiff	Audio interchange file format,
.amr	Adaptive multi-rate audio codec,
.avi	Video for Windows – any CODEC loaded
.bmp	Bitmap
.cin	Cineon
.cvp	ClearView auto play list
.dib	Device Independent Bitmap – MS Windows
.dif	DIF Stream
.dmos	MS-SSIM using the DMOS Scale parameters
.dps	DPS Velocity Video Editing Files
.dpx	DPX
.gen	AvidDS
.icb	TGA Still Image Variant
.jpg	JPEG Still Image
.jnd	ClearView Sarnoff's JND parameters
.js	Jaleo – SGI editor
.lkfs	Video Clarity lkfs parameters
.mpg. mpeg, .vob, .m1v, .m2v, .m2p, .m2t, .mpv	MPEG-2
.mpg, .mpeg, .m1v	MPEG-1
.mp1, .mp3	MPEG, audio layer 1, and layer 3
.m4v, .dat	MPEG-4 video part 2
.mov	QuickTime Video – any CODEC loaded
.mp4	MPEG-4 part 2 file; then H.264 file
.omf, .omfi	AVID file – any CODEC loaded
.peaq	Video Clarity PEAQ parameters
.pbm	Portable Bitmap
.pcx	Paintbrush Image
.pgm	Portable Gray map
.pic, .pct	Picture Still Image File
.pnm	Portable Any map Still Image
.ppm	Portable Pixel map Still Format
.psd	Photoshop
.psnr	ClearView PSNR parameters
.ras	Sun Microsystems Raster
.rgb	Raw RGB image file
.rgba	Raw RGB image with Alpha
.rtv	Video Toaster
.sgi	SGI still image
.spatial	ClearView SPATIAL parameters

Extension	File
.sun	Sun Raster Image
.temporal	ClearView TEMPORAL parameters
.tga	Targa Still
.tiff	Tagged Image Format
.vda	TGA Image Variant
.vst	Targa Vista Image Format
.wav	Waveform audio file format
.wma	Windows media audio
.xmb, .xpm	X Windows
.yuv	Raw YUV image
.yuv10	Raw YUV 10-bit format

To import a file, either

- Browse to the file location using the Browse button in the File Import Pane
- Drag and Drop a file onto the ClearView GUI

Figure 44: File Import Controls

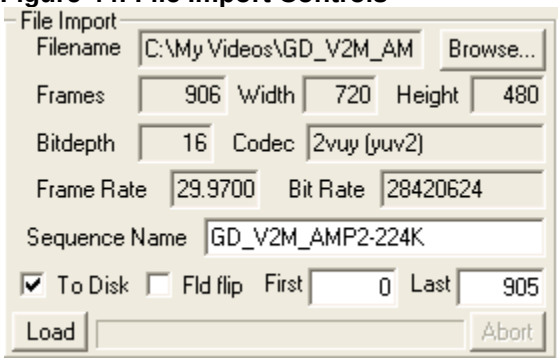


Table 9: File Import Descriptions

Filename	This is the name of the file to be input.
Frames	Total number of still files found in folder or the total number of frames found in a streaming media file. This is automatically filled in after reading the header of the selected file. *Note: if the header does not state the number of frames, then ClearView will calculate this number based on the size of the file and the bit-rate.*
Width	Width of the image (X-axis). This is automatically filled in after reading the header of the selected file.
Height	Height of the image (Y-axis). This is automatically filled in after reading the header of the selected file.
Bit depth	Depth of the image in bits. This is automatically filled in after reading the header of the selected file.
Codec	CODEC used to decipher this video sequence. Listed below under Color Format. This is automatically filled in after reading the header of the selected file.
Frame Rate	This is the frame rate of the video sequence if known (ex: if the frame rate is unknown, 0 is displayed). This is automatically filled in after reading the header of the selected file.
Bit Rate	This is the bit rate of the video sequence if known (ex: in the football sequence shown, the bit rate recorded was 1,194,393,600 / uncompressed HD). This is automatically filled in after reading the header of the selected file.
Sequence Name	This is the name of the video sequence that will appear in Play Mode and if a .CVO (ClearView Overlay) file does not already exist, it will be created with this

	text.
To Disk	When checked, import to the File System. When unchecked, import to Memory. *Note: Audio is not currently written to Memory.*
Fld Flip	Reverse (flip) the top and bottom fields during import.
First	The first frame to be loaded from a sequence of files. You can use this to import part of the video sequence.
Last	The last frame to be loaded from a sequence of files. You can use this to import part of the video sequence.
Load	Initiates the load process. This converts the video sequence, and loads it to the file system or memory.
Abort	Aborts a load in process. You must re-browse after an abort. You cannot change parameters and then click Load again.

The procedure to import a file differs slightly depending on the source. The following are possible scenarios.

Auto Load a sequence of files from an external source

When ClearView sees .TXT, it knows that this is a tab-delimitated file which tells it to load many video sequences. Otherwise, it tries to figure out what type of video sequence is in the file. In this case the user is batch loading many video clips. The video clips may be stored in one or many directories, and this one file will go out and bring them all into ClearView. Each video clip might be MPEG, BMP, RAW, etc.

Note: There are many examples under www.videoclarity.com/Support (Miscellaneous Support Files).

The fields in the .TXT file are as follows.

Table 10: Auto Load Descriptions (.txt file)

Filename	You can drop a file from the desktop, type in the full path and filename, or select Browse to find the file
Sequence Name	This is the name of the sequence that will appear in Play Mode (up to 35 characters)
Image Type	Unused, but must be present
First	The first frame to be loaded from a sequence of files or the first frame to be loaded from a streaming media file. (-1: means first)
Last	The last frame to be loaded from a sequence of files or the last frame to be loaded from a streaming media file. (-1: means last)
To Disk	When 1, import to the File System. When 0, import to Memory. *Note: Audio is not currently written to Memory.*

Play a list of Video Sequences

When ClearView sees the .CVP, it knows that this is a tab-delimitated file, which tells it how to playback many files.

Note: Please remember that to play files you must already have loaded the video sequences into ClearView.

The fields in the .CVP file are as follows.

Table 11: Play List Descriptions (.cvp file)

Sequence Name	This is the name of the sequence that will appear in Play Mode
First	The first frame to be loaded from a sequence of files or the first frame to be loaded from a streaming media file. (-1: means first)
Last	The last frame to be loaded from a sequence of files or the last frame to be loaded from a streaming media file. (-1: means last)
Repeat	Play this sequence X number of times.

Import Objective Metric Log File

The objective metric log file includes:

- Objective Metrics – AFREQ, APEAK, LKFS, DMOS, JND, PEAQ, PSNR, SPATIAL, or TEMPORAL
- Clip Alignment Parameters
- Image and Video formats
- Video Sequence names and Library locations
- Default parameters used when calculating the metrics

If the library, video sequences, etc. exist, then

- the video sequences will be loaded,
- the clip alignment will be set, and
- the objective metrics will be restored (no need to recalculate).

Note: We store the DMOS, JND, PSNR, SPATIAL, and TEMPORAL data in different files

The fields in the .DMOS, .JND, .PSNR, .SPATIAL, and .TEMPORAL files are as follows.

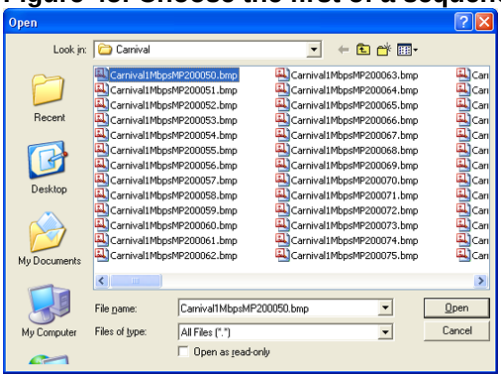
Table 12: Objective Metric Log File Description

Log File Type	This says whether the file has DMOS, PSNR, SPATIAL,TEMPORAL tPeak, PEAQ or LKFS data in it.
Library A Library B	These are the locations where the Video Sequences are stored *Note: if the Library does not exist, then an error message will be posted*
Sequence A Sequence B	These are the Video Sequences to load. *Note: if they are not in the Library, then an error message will be posted*
First Frame A, Last Frame A, Speed A, First Frame B, Last Frame B, Speed B	These are the Clip Alignment Parameters for each sequence. *Note: if the first and last frame are not within the range, then an error message will be posted*
Frame, Y, Chroma, Fail Y, Fail Chroma	This is the header for the DMOS & JND data. The data for each frame is recorded as Y values and the Chroma (CbCr combined) values. The last 2 columns are pass/fail against the threshold.
Frame, Y/G, Cb/B, Cr/R, Y/G, Cb/B, Cr/R, Y/G, Cb/B, Cr/R, Fail Y, Fail Cb, Fail Cr	This is the header for everything that is not DMOS & JND. It consists of the frame number and 12 more columns. The first set of 3 values are for Viewport A (if the data is No Reference), the second set of 3 values are for Viewport B (if the data is No Reference), the third set of 3 values are for the results (in No Reference this would be the subtraction; in PSNR, this would be the data), the fourth set of 3 values are pass/fail against a threshold.

Load a series of files with the same extension

File Importer will search the folder for all files with sequential file names. The file names must have at last 4 digits and must be sequential. An example is listed below that has 5 digits.

Figure 45: Choose the first of a sequence of BMP files



Note: the File Import pane will display information about the file or files that have been selected. In this example, .bmp files are imported. However, this behavior is the same for any file type.

Load Headerless files

File Importer needs to know more about these files to load them correctly. Header files have been defined to help ClearView to understand this data the description of the file is defined in File Import Descriptions below

- .hdr – this is used when all of the headerless data is in 1 file
- In the case of 1 frame per file no header file is needed

Note 1: Many YUV formats can be loaded directly by ClearView. If File Importer cannot load the file properly, then you will need to create a .hdr

Note 2: You can either double click (or drag & drop the headerless file to load.

The.hdr file contains the following data. Some of the data is marked as Optional, and can be omitted. Regardless, you must start with % and the name.
Note: There are many examples under www.videoclarity.com/Support (Miscellaneous Support Files).

Table 13: Raw File Import Descriptions

%Color Format	YUV420 – Planar YCbCr in IYUV/I420 order (ST/Thompson/MPEG Groups) YV12 – Planar YCbCr in YV12 order YUV422P – Planar YCbCr with 4:2:2 sub sampling (Sony) YVU422P – Planar YCbCr with 4:2:2 sub sampling (chroma inverted) YUV422_10 – Interleaved 10 Bit YCbCr v210 format (standard Quick Clip 10 Bit YCbCr) YUV4224_10 – Interleaved 10 Bit YCbCr v210 format with alpha/key channel YUV4224 – Interleaved 8 Bit YCbCr yuv2/UYVY format with alpha/key channel YUV422_fields – Separate fields of 4:2:2 YCbCr (Crescent) YUV422 – Interleaved 8 Bit YCbCr UYVY format (standard Quick Clip 8 Bit YCbCr) UYVY422 - YUV 4:2:2 interleaved 8 bit packed as U Y V Y U Y V Y ... YUY2 - YUV 4:2:2 interleaved 8 bit packed as Y U Y V Y U Y V ... DPXRGBLEFILL - DPX 10 bit RGB, little endian, filled DPXRGBLE - DPX 10 bit RGB, little endian, padded DPXRGBFILL - DPX 10 bit RGB, big endian, filled DPXRGB - DPX 10 bit RGB, big endian, padded DPXABGRLEFILL - DPX 10 bit ABGR, little endian, filled DPXABGRLE - DPX 10 bit ABGR, little endian, padded DPXABGRFILL - DPX 10 bit ABGR, big endian, filled

	DPXABGR - DPX 10 bit ABGR, big endian, padded RGBA – 32 Bit Interleaved RGB (TIFF) ARGB – 32 Bit Interleaved RGB (Mac) BGRA – 32 Bit Interleaved RGB (Windows BMP/TGA) BGR – 24 Bit Interleaved RGB (Windows BMP/TGA) TIFF24 - 24 Bit Interleaved RGB TIFF ordering TIFF32 - 32 Bit TIFF (same as RGBA) PRGB - 8 bit x 3 Planar RGB PRGBA - 8 bit x 4 Planar RGBA PBGR - 8 bit x 3 Planar BGR PABGR - 8 bit x 4 Planar ABGR PBGRA - 8 bit x 4 Planar BGRA PARGB - 8 bit x 4 Planar ARGB FULLDUAL - 10 bit dual frame YCbCr (stereo) STEREO8 - Dual 8 bit YCbCr interleaved streams (one after another) STEREO10 - Dual 10 bit YCbCr interleaved streams (one after another) DV25 - DV25 'dv/dif' stream 4:2:0 or 4:1:1 8 bit SD DV50 - DVCPro 50 stream 4:2:2 8 bit SD DV100 - DVCPro HD/DV-100 stream 4:2:2 8 bit HD IMX30 - Sony IMX MPEG 30 Mbit stream 4:2:2 8 bit IMX40 - Sony IMX MPEG 40 Mbit stream 4:2:2 8 bit IMX50 - Sony IMX MPEG 50 Mbit stream 4:2:2 8 bit ARRIBAYERDLRAW12 - ARRI dual link raw 12 bit layer packed into YCbCr 10 Grey - 8 bit grey/gray plane of video data
%Image Size	"Number of Rows" "Number of Columns" (ex: 486 720; note the 'x' cannot be used)
%Number of Fields per Image	This should be ‘1’ unless you want us to take 2 images and interlace them together.
%Number of Images	This number is calculated based on the number of video sequences within the folder. If you use a small number, then less will be read into memory, so set this number high. (Optional).
%Frames per second	23 (23.98), 24 (Standard film), 25 (PAL/25p/50i), 29 (29.97 -NTSC/29.97p/59.94i), 30 (NTSC NDF/30p/60i), 50 (50p), 59 (59.94p - for 720p), 60 (60p - for 720p)
%Header Offset	If there is a header on the file, then place the number of bytes into the file where the video starts/size of the header (Optional)
%Video Offset	If there is an additional offset before the start of the video that is not a header, then place the size of it in bytes here. (Optional)
%Video Alignment	To speed up disk access, the files are padded to the nearest block size. This is normally set to 512 for Windows. (Optional)
%Video Name	This is the name of the first still image. The 000 must be present. If an extension is not named, then it will search for .raw, .yuv, and .bin, in that order, before returning an error. (Optional) Note: The name of the first frame must contain “000” (e.g., VideoSequence000) and the second frame “001” (e.g., VideoSequence001), etc. This is because the software sorts the frames before loading them, and in Windows, the ordering would be 000, 001, 002, 003, 004, 005, 006, 007, 008, 009, 010 (in other words “1” would actually be loaded as frame 100). Of course, you could use 0000 (4 zeros) if you have more than 999 frames.
%Audio Name	This is the name of the .wav or .aiff file associated with the video.

%Timecode	This is the time code for the first video frame. It will run continuously from here. Given as hrs:min:sec:frames (Optional)
%Userbits	A query of the value of the user bits will return this value for all frames. (Optional; ClearView does not currently extract the user bits.)
%Start Frame	This indicates the frame number of the first frame in the video file. It is normally 0, unless you are using some type of circular file as input. (Optional) CAUTION: If you were writing the file when you asked ClearView to start importing it, then you may create a situation where the pointers formed a circle (used the same disk space over and over). This is very dangerous, as ClearView may read too fast or too slow, and it is asynchronous.

Hardware Input Parameters

The Record pane allows you to record the current ClearView sequences, or to record from the Broadcast or IP Input. The list of Input Sources (input devices) is dependent on the ClearView input modules installed. While recording from the video source, ClearView will do the following:

- Capture based on the sensed video format. *Note: during IP input, the format that is used for import is that selected by the video format selection under Video Output .*
- Store the uncompressed video sequence on the file system or in memory.
- Create the detailed and thumbnail information.

Below is a table explaining the fields in the record pane tabs.

Table 14: Record Pane Description

Input	ClearView supports the following Inputs if the Modules have been purchased • ClearView Output: records the video sequences currently playing in the preview window as a new Video Sequence. *Note: This is useful if you want to export a Split AB image or re-record after spatial alignment/normalization.* • Broadcast Input: records the video sequence from the Broadcast I/O Module (i.e. SDI, HD-SDI, 3G-SDI, HDMI, Component, S-Video, and Composite). • IP Input: records the video sequence from the multicast address and port number specified in the configuration menu
Config	Configure is different depending on the Input Source • ClearView Output: No meaning; thus, it is disabled. • Broadcast Input: Select the Input and Analog format • IP Input: configure the IP stream input
Record Mode	This only applies to the Broadcast Input Module • Input/Output – this allows you to simultaneously record and play up to 1080i • Single Input – this allows you to record 1 channel • Dual Input – this allows you to record up to 2 channels up to 1080i
Library	This lets you set the library for recording so that you can change it from the library used for playing
To Disk	Checking this button records the input to the file system Unchecking records the input to Memory *Note: Audio is not currently written to Memory.*
AOI	If you have zoomed and panned to a particular area. You can record the video sequence in 1 of 2 ways: • AOI checked: Record the video sequence with pixel replication turned off, but only record the pixels shown on the preview window. (i.e. with zoom 2x and a 1920x1080 video sequence, this will record a video sequence with the size 960x540. • AOI unchecked: Record the video sequence as it is displayed in the preview window. Possibly with pixels replicated. *Note: to play a reduced size video sequence, you can use no video output*

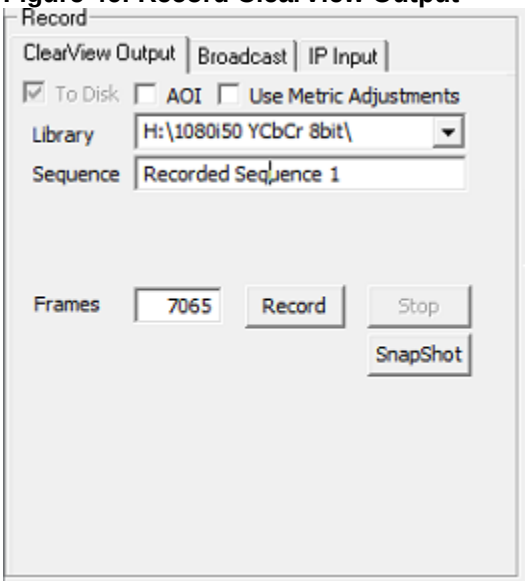
	mode.
Use Metric Adjust	Checking this box will start the process of re-recording the 2 video sequences associated with Viewport A and Viewport B. The video sequences are re-recorded after apply spatial alignment, normalization, and windowing. *Note 1: for spatial alignment, the alignment must be an even number to avoid color shifts in Y'CbCr space and/or flipped fields in interlaced modes.* *Note 2: for spatial alignment, both sequences are moved and centered while performing the adjustment.*
Sequence	This is the name that is displayed in the thumbnail. *Note: this can be renamed later.*
Frames	Select the number of frames to record in the Record Pane. The number of frames defaults to the maximum number of frames available in memory or on the disk.
Abort on Drop	Checking this aborts the record on the first dropped frame Unchecking this allows the system to keep recording albeit with the error frame.
Status	This simply says previewing, recording, or nothing.
Drop	This increments the number of frames that have been dropped.
Out enable	If you are using the CV-SDI-IO-DL or CV-SDI-IO-LHI module, then this button will be active. It allows the operator to capture and playback simultaneously. • Playback must be connected to SDI out #1 • Input must be connected to SDI in #2 • Genlock will free run unless you connect a Genlock device *Note 1: Dual Link will not work.* *Note 2: Input is connected to SDI In #2.*
Preview	Press this button to preview the record from Broadcast or DVI to make sure that something is connected to the input. *Note: In Broadcast Input or DVI Input modes, preview is not active on the preview window once you select the record button. A hardware preview is supplied with the Broadcast and DVI Input Modules.*
Record	Start the record process. It will automatically end when the frame count is reached
Snapshot	Press this button to export the current frame in the preview screen as a BMP to the Library that is selected in the ClearView Output Tab. This can now be done with a single click – no need to do a record/export sequence.
Stop	Stop recording

Record ClearView Output

The ClearView Output tab allows the user to record the video sequences currently playing in Viewport A and Viewport B. 3 reasons exist to do this

- Record split screen video sequences as a single video sequence so that they can be exported later for offline analysis/viewing
- Record a portion of the video sequence (or split screen video sequences) as a single video sequence so that they can be exported later for offline analysis/viewing. ClearView records the video area with the zoom box, when AOI is checked.
- Record both video sequences as new video sequences after applying spatial alignment, normalization, and window commands. ClearView records the new video sequences to show the user the effect of the adjustments when the Use Metric Adjustments is checked.

Figure 46: Record ClearView Output



To record the current ClearView sequence, jog to the desired frame. In the Clip Alignment pane, set the first frame. To record a number of frames, you can either set the last frame in the Clip Alignment pane or you can select a number of frames in the Record pane.

You would want to record the output of ClearView if you intended to:

- Export the video sequences as they are playing side-by-side to an AVI file (or BMP, Raw, etc.)
- Export the video sequence as a smaller version (just looking at the spokes of the wheel as opposed to the whole car).
- Create 2 new video sequences after the spatial alignment and normalization has adjusted the 2 video sequences relative to each other.

Note 1: that if you simply want to hit play and then record, you do not need to set the Clip Alignment. If you want to record just from frame n to frame m, and give it a new name, etc., you need to use a combination of the clip alignment and the record function.

Note 2: Please be in Stop mode before starting the record or you will record more than 1 first frame. (Of course, you can edit these out, using the Clip Alignment pane.) This is because in pause mode, ClearView is displaying the same frame over and over. If you hit record while ClearView is doing this, then it will record that same frame over and over. In Stop mode, ClearView is not displaying, but the last frame that was played stays on the screen. The confusing part is that when you hit play, it will not start at this frame. It starts at the frame number given by the "clip alignment first frame" (probably frame 0).

Record 1 Broadcast Input

In Broadcast input mode, make sure the source is connected before previewing and ClearView will auto senses the video format. To make sure that it has selected the correct format, select the Config button which is displayed below.

Figure 47: Record 1 Broadcast Input

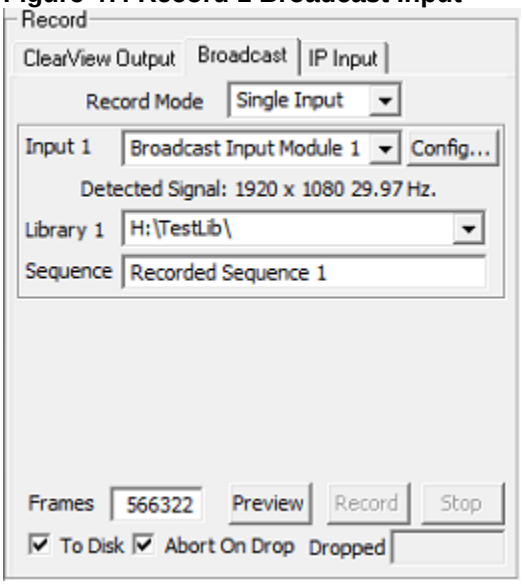


Figure 48: Configure Broadcast Input Module

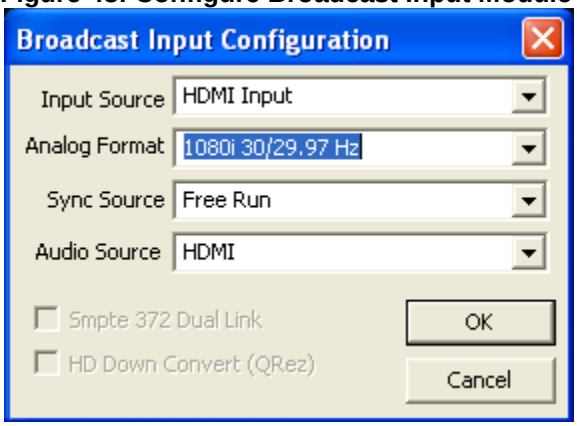


Table 15: Configure Broadcast Pane Description

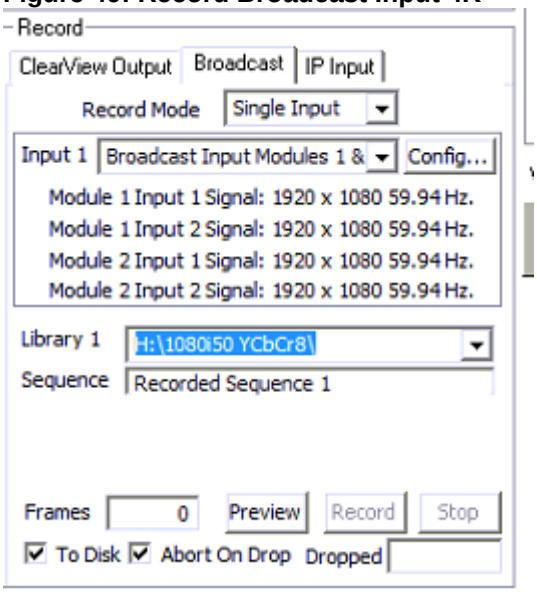
Input Source	Chose among HDMI, Analog, SDI if you have a CV-SDI-IO-LHI module
Analog Format	Chose among various 525 (486i), 625 (576i), 720P, and 1080i analog input standards
Sync Source	Chose among SDI#1, SDI#2, External or Free Run (no source)
Audio Source	Chose among embedded HDMI, embedded SDI, Analog, and AES if you have a or CV-SDI-IO-LHI module or embedded SDI and AES if you have a CV-SDI-IO-DL module
SMPTE 372 Dual Link	If you have a CV-SDI-IO-DL module and you are using both inputs in Dual Link mode, then check this box
HD Down Convert (QRez)	*Do not touch this*

The Broadcast tab – Record Mode Single Input records the video sequence as sensed on the HDMI or SDI input. The SDI can be either SDI Input #1 or SDI Input #2 and the HDMI can only be set as HDMI Input (as set by Config).

ClearView Extreme-4K: 1 Broadcast Input

4K ClearView Extreme can record up to 25Hz when using "Broadcast Output Module 1" or "Broadcast Output Module 2", but can record in up to 60Hz when using "Broadcast Output Module 1 & 2". The image below shows how the signals will appear.

Figure 49: Record Broadcast Input 4K



This will display what each input module is seeing, with 1 being the top most input of the broadcast board and 2 being the one below that.

Note: ClearView Extreme-4K does not support "Record 2 Broadcast Inputs" or "Record Broadcast Input while Playing" as outlined in the next sections for any Quad/HD 4K formats.

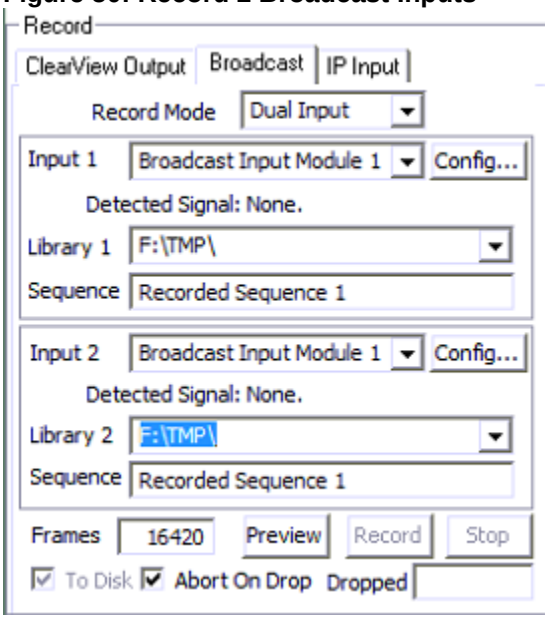
Record 2 Broadcast Inputs

The Broadcast tab – Record Mode Dual Input records the video sequences as sensed on both SDI inputs. Each video can go to a different library and both must have different sequence names.

Note: For systems configured with separate G and H libraries (which are two separate disc arrays), HD formats must be recorded to separate libraries, one to a library in G and one to a library in H. This is to maintain real-time capabilities and designated frame rates.

For those system configured with only one disc array, "F" for instance. These systems can record two, play two and play while record two sequences to one or two libraries on the single "F" array up to the format capacity of the IO subsystem.
Examples:
-Extreme 4K systems with dual interface, up to two 1080p60
-Extreme X2 systems with dual interface, up to two 1080p60
-Shuttle Dual or Single interface systems, up to two 1080i60 (new models sold from May, 2012)

Figure 50: Record 2 Broadcast Inputs

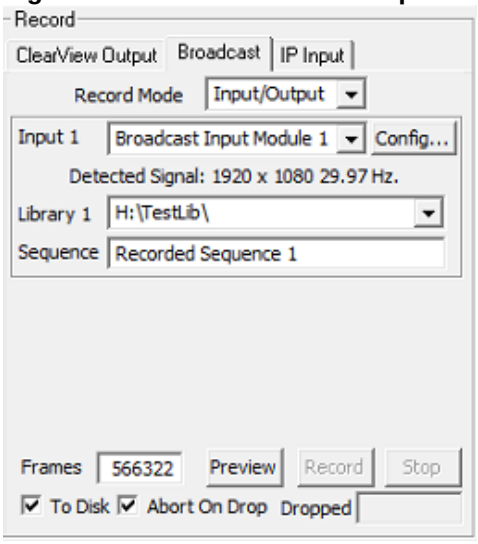


Record Broadcast Input While Playing

The Broadcast tab – Record Mode Input/Output records the video sequences as sensed on the Input selected. The outputs on the broadcast board will play out the video that is currently in the viewport. This allows the user to play through SDI and encode the signal to be recorded into the machine. Once the preview has started and displays the video, the recording can start by pressing the record button. The video format must be the same (i.e. both 1080i).

Note: For systems configured with separate G and H libraries, HD formats must be played from one library(G or H) and recorded to the alternative library (G or H). If you want to play to a video encoder while recording from a video decoder. Then set the sync source to SDI #2 (the source) under Config.

Figure 51: Record Broadcast Input While Playing



Note: ClearView Extreme-4K does not support "Record 2 Broadcast Inputs" or "Record Broadcast Input while Playing for any Quad/HD 4K formats.

Record 1 IP Input

In IP input mode, a configuration option will pop up as shown below. The video format needs to be set in the main ClearView window under Video Output.

Figure 52: Record 1 IP Input

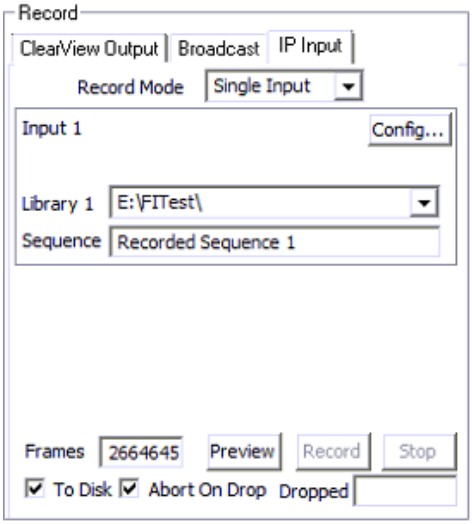


Figure 53: Configure IP Input

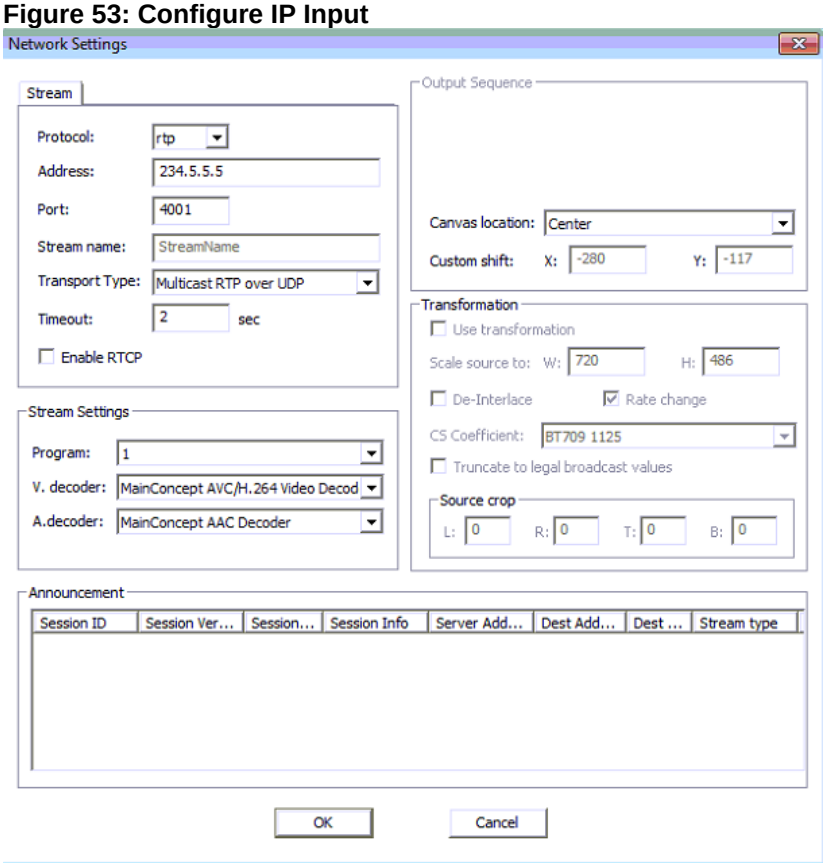


Table 16: Configure IP Input Description

Protocol	Chose among the three protocols of the incoming stream: • RTP • UDP • RTSP
Address	The address that the stream is located
Port	The port number to find the stream
Stream Name	When using RTSP Protocol, specify the stream name
Transport Type	The transport type of the stream: • Mpeg2 TS AVP/UDP Unicast • Mpeg2 TS AVP/UDP Multicast • Mpeg2 TS AVP/TCP Unicast • Unicast RTP over UDP • Multicast RTP over UDP • Multicast Raw over UDP • Interleaving • Unicast Raw over UDP • Unicast Raw over TCP
Timeout	The timeout value for the current stream
Program	Choose the MPTS to Import
V. Decoder	Chose the video decoder to use
A. Decoder	Chose the audio decoder to use
Announcement	Display SAP announcement on the network
Output Sequence Pane	*See FileImporter Description* • Canvas Location • Custom Shift
Transformation	In order to modify the Transformation values, check the use transform box *See FileImporter Description* • • • Scale Source to • De-Interlace Imported Video • Rate Change • Truncate to Legal Broadcast Values • • • CS Coefficient • Source Crop

Note: In order for the stream setting to appear, first input the settings for the stream and click ok then Preview in the ClearView GUI. Stop the preview and reopen the configuration menu to have the setting appear.

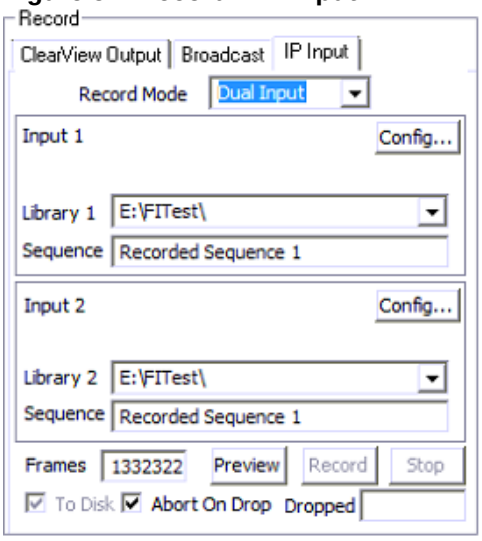
The IP Input tab – Record Mode Single Input records the video sequence as sensed at the multicast address and port specified from within the configuration menu.

Note: IP input will only work on ClearView Extreme systems with Windows 7 or machines built after and including May 2012.

Record 2 IP Inputs

The IP Input tab – Record Mode Dual Input records the video sequences as sensed on two separate multicast addresses and ports specified from within the configuration menus. Each video can go to a different library and both must have different sequence names.

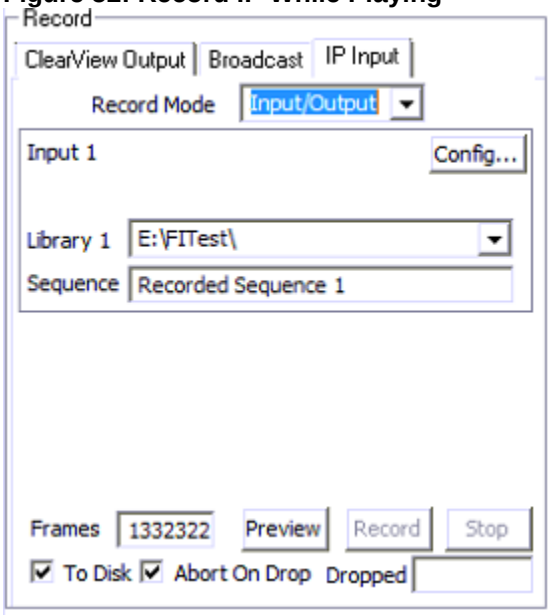
Figure 51: Record 2 IP Input



Record IP While Playing

The IP Input tab – Record Mode Input/Output records the video sequences as sensed by the multicast address and port. The outputs on the broadcast board will play out the video that is in the viewport. This allows the user to play through SDI and encode the signal into an IP stream to record from the IP input. Once the preview has started and displays the video, the recording can start by pressing the record button. The video format must be the same (i.e. both 1080i).

Figure 52: Record IP While Playing



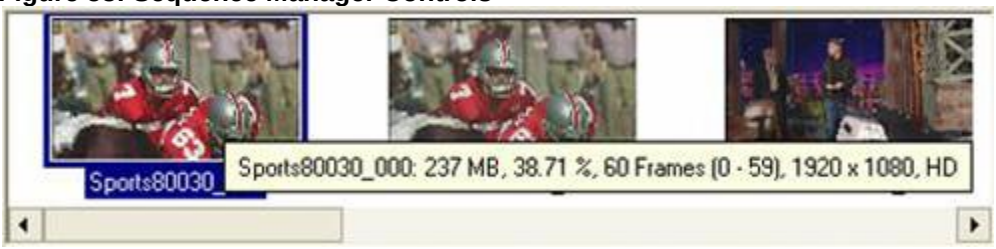
Select Thumbnail to Play or Export

The Sequence Manager pane displays thumbnails (or details) of the video sequences currently loaded into the current ClearView library. Two video sequences can be loaded at any time. Each video sequence is assigned a Viewport. After a file is imported or a video sequence is recorded via hardware inputs, the first video sequence is mapped to Viewport A. The second sequence loaded is mapped to Viewport B.

Note 1: If you are trying to achieve ultra-high frame rates, then it is preferable to load only one Viewport or to run from memory.

Note 2: Please remember that the sequence to be displayed must have the same bit depth (8, 10-bit), color space (4:4:4, 4:2:2), and resolution (1080i, PAL, NTSC) as the current video output format (specified in the Video Output pane). Hovering the mouse over a sequence thumbnail will display the property information about the selected sequence.

Figure 53: Sequence Manager Controls



This figure shows the pop-up display of video clip properties when the mouse cursor hovers over the thumbnail.

- You can drop a video sequence onto the Viewport.
- In A-only mode, the video sequence will be assigned to Viewport A
- In B-only mode, the video sequence will be assigned to Viewport B
- In A-B mode, the first video will be assigned to Viewport A. Every subsequent video sequence will be assigned to Viewport B.

- In the other modes, moving the video sequence to the left side of the Viewport (or top in Horizontal Split) will assigned it to Viewport A. Moving the video sequence to the right side of the Viewport (or bottom in Horizontal Split) will assign it to Viewport B.

As the following figure shows, right-clicking on a sequence thumbnail allows you to change the Viewport assignment, to unload video sequences from memory or disk, to see the details, or to export the video sequence to a file.

Renaming the video sequence can be done by left clicking on the sequence name in Details or Thumbnails modes.

The default Thumbnail of any sequence is the first frame of that sequence. There is the ability to change the Thumbnail frame.

- One can change the Current Thumbnail image for a frame by placing the sequence in a Viewport, moving the sequence to the desired frame and right clicking the Thumbnail in the top portion of the GUI and choosing “New Thumbnail”.

Sorting the Sequence Manager Pane can be done in Details or Thumbnails modes.
In Thumbnails mode:

- Grab a sequence with the mouse, and drop it where you would like to move it. *Note: you cannot move the sequence to the first position. To move it to the first position, you need to move the sequence to the second position, and then move the first sequence to the second position.*

In Details mode:

- Sort based on any of the file type headers: Name, File Size, etc.

Figure 54: Sequence Manager Drop Down Menu

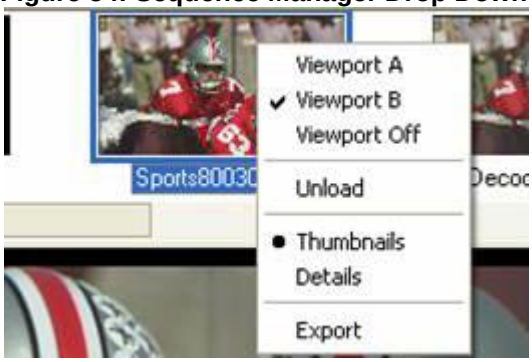


Table 17: Sequence Manager Descriptions

Viewport A	Assigns the video sequence to Viewport A (left or top window).
Viewport B	Assigns the video sequence to Viewport B (right or bottom window).
Viewport Off	De-Assigns the video sequence from both Viewport A and Viewport B
Unload	Removes the video sequence from ClearView (unloads memory or erases from disk)
Thumbnails	Sets the video sequence viewing mode to Thumbnails
Details	Sets the video sequence viewing mode to Details
Export	Exports the video sequence to disk.

Choosing Export opens the following dialog box:

Figure 55: Sequence Manager Export Controls

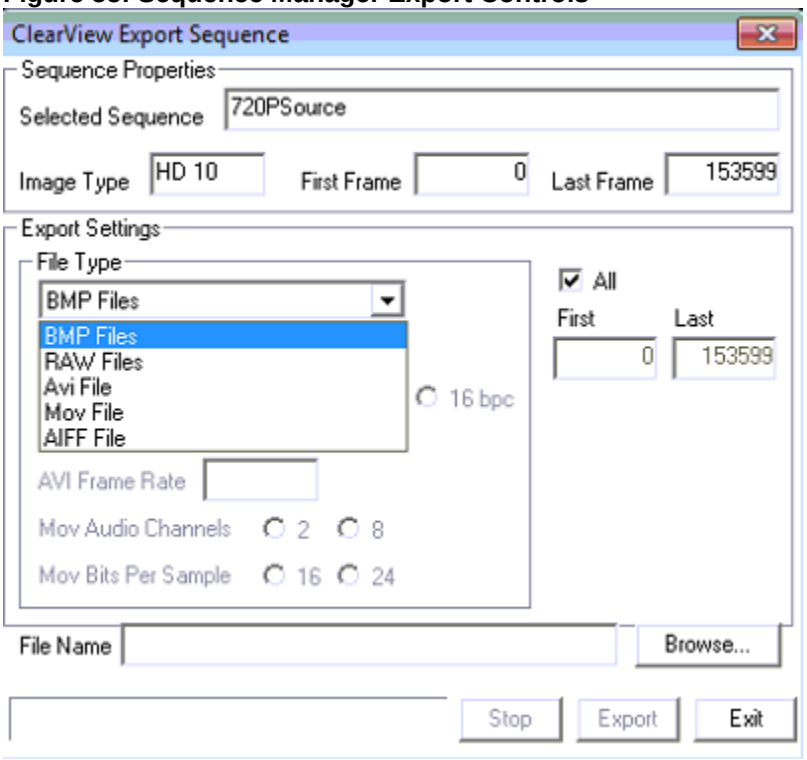


Table 18: Sequence Manager Export Descriptions

Sequence Properties	Selected Sequence, Image Type, First Frame, Last Frame are informational only. They cannot be changed
File Type	The video sequence can be exported as a BMP, RAW, MOV, AIFF or AVI file
All	Checking this box exports all of the frames. Unchecking this box allows you to set the first and last frame to output.
File Name	You can type in the full path and filename or select Browse to find the file
First	First frame to be exported.
Last	Last frame to be exported
Browse	Navigate to the filename
Stop	Stop exporting
Export	Start exporting
Exit	Close this window

Note 1: You can output one video sequence to multiple files by exporting a list of frames (first frame/last frame) to multiple files (i.e. choose a File Name and press Export; then change the first frame/last frame and choose the next File Name and press Export).

Note 2: When exporting an AVI file it cannot be larger than 2 GB.

Note 3: When exporting BMP files it will be converted to RGB format.

Select a View Mode

The View Mode pane allows you to select the current viewing mode.

Figure 56: View Mode Controls

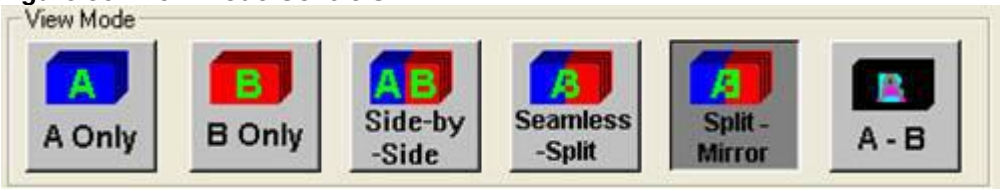


Table 19: View Mode Descriptions

A Only	Display only Viewport A; i.e., the video sequences associated with A. (Note: Viewport B may be playing).
B Only	Display only Viewport B. (Note: Viewport A may be playing).
Side-by-Side	Display Viewports A and B side –by side.
Seamless-Split	Display Viewports A and B flowing as if they were 1 video sequence. The left side of the display is Viewport A, the right side is B.
Split-Mirror	Display Viewports A and B, with B inverted right to left as if in a mirror.

A-B	Three types of A-B exist:
	• A display of the pixel differences,
	• A display of the absolute value of the pixel differences over a threshold for just the Y or Chroma values, and
	• A display that the pixels are different beyond a threshold for just the Y or Chroma values. If the pixels are not different, then the original video sequence is shown.
	The Color Space Pane controls which mode is active.
	
	If (A-B difference threshold in the Color Space pane) is unchecked, then each pixel in video sequence B is subtracted from video sequence A. The result is displayed. If the resultant is less than absolute black, then absolute black is displayed.
	
	If (A-B difference threshold) is checked and (A-B Add Back) is unchecked, the luma (Chroma unchecked) or chroma (Chroma checked) pixels in video sequence B are subtracted from video sequence A. If the absolute value of the subtraction is greater than the threshold, the result is displayed.
	
	Note: In either of the above, the value is probably a small number. Using the Color Space pane, the user can load a LUT (look-up table) to enhance small differences. There are many LUT examples under www.videoclarity.com/Support (Miscellaneous Support Files).
	
	If (A-B difference threshold) is checked and (A-B Add Back) is checked, the luma (Chroma unchecked) or chroma (Chroma checked) pixels in video sequence B are subtracted from video sequence A.
	• If (A-B) >= Threshold, a Green pixel is displayed
	• If (B-A) >= Threshold, a Yellow pixel is displayed
	• If (((A-B) < Threshold) && ((B-A) < Threshold)), the original video sequence is displayed
	
	Note: B-A can be achieved using the Play Control Pane's Swap A/B.

In a typical operation, the original uncompressed clip (the original source file) and the corresponding decompressed clip (a compressed version of the source file, decompressed by ClearView) are shown as successive thumbnails.

Note, however, that there is no restriction on the assignment of clips to Viewports. You are free to assign any still or clip to either Viewport, whether that makes any sense or not. Thus you could do an A-B of a still and a clip, or A-B of two totally unrelated clips, and get visually entertaining but totally meaningless results.

Select VTR Mode

The VTR Control pane functions similar to a VCR allowing full temporal control of the sequence(s) being viewed. For each clip, the currently mapped sequence and currently displayed frame number are displayed in the two fields next to the labels Viewport A and Viewport B.

Figure 59: VTR Controls

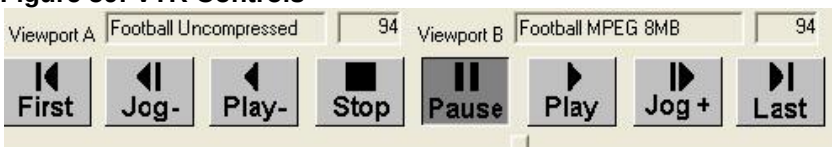


Table20: VTR Control Descriptions

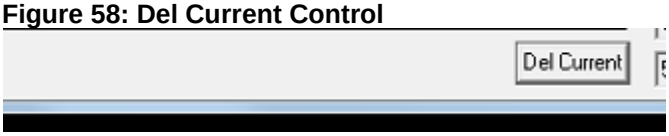
Viewport A, Viewport B	This is an information message. It is the name of the sequence(s) playing and the current frame number. *Note 1: The frame number does not increment smoothly while playing. This is because GUI updates (refreshes) are a low priority to keep the video playing well.* *Note 2: The disk array drive letter is displayed to help when multiple disk arrays are present in 1 system.*
First	Move to the first frame.
Jog-	Jog backwards one frame.
Play-	Play backwards at the chosen rate. Rate is chosen in the Clip Alignment pane
Stop	Do not process any more data. Stop.
Pause	Continue to process the current frame at the displayed rate.
Play+	Play forwards at the chosen rate. Rate is chosen in the Clip Alignment pane.
Jog+	Jog forward one frame.
Last	Move to the last frame.
Slider Bar	Move to a specific frame. The frame number is displayed above the VTR controls; next to the Viewport video sequence name. *Note: the slide bar does not move when the file is playing*

Delete Current Sequences

The Delete Current control will delete the sequences that are currently in viewport A and viewport B from the hard disk space. If there is a log file associated with the current view that will also be deleted.

Note: There is a setting in the ClearView configuration menu to ask to confirm the deletion.

Figure 58: Del Current Control



Select Objective Measurements

The Objective Measurement Graph pane displays the graph of the JND, PSNR, PSNR No Ref, Spatial, or Temporal over time. The actual value, minimum, maximum and average values are displayed in the Objective Metric Controls pane. Examples, using the various objective measurements are on our website under www.videoclarity.com/WhitePapers.html.

The Objective Metrics can be used to calculate the perceived video quality (Sarnoff JND, DMOS), perceived audio quality (PEAQ), QC a product when the results are known (PSNR with Thresholding), looking for artifacts when no reference is present (PSNR No Ref, Spatial and Temporal). In all cases, the metrics are displayed and written to a LOG file for off-line analysis.

AFREQ

The Audio algorithm measures the peak amplitude of an envelope of audio data. It is a full reference as it measures the differences between the original and processed video in absolute terms. This is termed an objective metric, as it does not talk about perceived quality to the human ear. It measures absolute differences.

APEAK

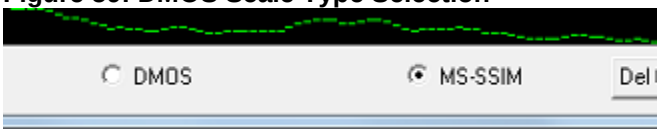
A-Peak measures the true peak amplitude of the channels chosen and gives a value for each frame and a separate value for each channel. A-Peak is a no-reference metric. The value of the metric corresponds to the highest absolute value of a sample for a single audio channel in a single frame. Measuring in dB (decibels) the maximum value is 0 dB and the value closest to silence is -60 dB. ClearView supports the standards ATSC A/85, EBU R 128, ARIB TR-B32, and NAB T032 that control parameters and Momentary, Short Term, and Integrated that determine the timescale variable. The true peak(A-Peak) is based on the ITU-R BS. 1770.

DMOS

The MS-SSIM algorithm from the University of Texas is used as a basis for a top-down way of predicting the video quality. This is a full reference algorithm as it measures the perceived structural similarity between the original and processed videos. It then correlated this data to the DMOS scale using the LIVE database at the University. The DMOS scale is between 0 and DMOS Max Value (4, 7, or 10 based in the ClearView Configuration Menu); where 0 is perfect. The MS-SSIM scale is between 0 and 1, with 1 being perfect. For more information about MS-SSIM or the DMOS scale, please refer to our website at www.videoclarity.com/WhitePapers.html.

The selection dial at the bottom of the objective measurement graph for DMOS is used to choose which scale to display.

Figure 59: DMOS Scale Type Selection



JND

The Sarnoff JND model is a method of predicting the subjective rating of a group of human testers using a bottom-up approach. It looks for macroblocks, blur, luminous variations, etc. and predicts a score. It then correlates this score to the JND scale using the VQEG database. The JND is theoretically between 0 and 100; where 0 is perfect. In practice, the number should never exceed about 13 or 14. For more information about the Sarnoff algorithm or the JND scale, please refer to our website at www.videoclarity.com/WhitePapers.html.

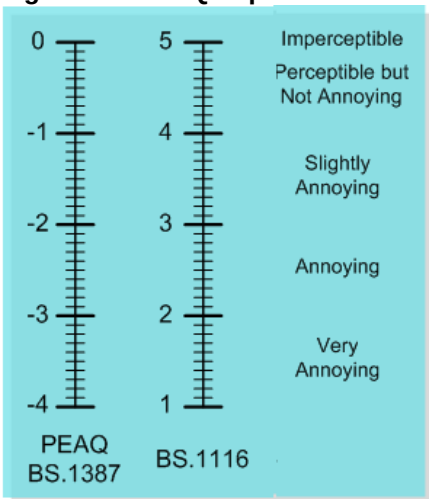
LKFS

LKFS, Loudness K-weighted relative to Full Scale, can be run by checking the box within the a-Peak tab. LKFS is a no-reference metric. This metrics gives a measurement that will take the peak loudness (amplitude) over a variable time scale over all audio channels, and respond with one value for all channels that corresponds to that one second time period. The values that are returned are based on a logarithmic scale with 0 being the maximum value and -60 being close to silence. The LKFS is based on the ITU-R BS. 1770. ClearView supports the standards ATSC A/85, EBU R 128, ARIB TR-B32, and NAB T032 that control parameters and Momentary, Short Term, and Integrated that determine the timescale variable.

PEAQ

The PEAQ audio objective perceptual quality measurement model processes two audio signals to be compared (original reference signal and the test version to be evaluated) and calculates a quality score similar to the mean opinion score that would be obtained for a formal subjective test. The average used is the quadratic average. The perceptual rating generated by the PEAQ model represents the overall severity of the impairments in the test signal as compared to the reference.

Figure 60: PEAQ Impairment Scales



PSNR

The PSNR algorithm measures the video differences between the original and the processed video in absolute terms. This is termed an objective metric as it does not talk about perceived quality to the human eyes. It measures the absolute differences using the following algorithm.

$$PSNR = 20 \log \left(\frac{P}{\sqrt{\frac{1}{m * n} \sum \sum (x(i,j) - y(i,j))^2}} \right)$$

- P = the peak pixel value. Normally, 235 for broadcast video or 255 for 8-bit PC data. This is set in the ClearView Configuration Menu.
- m,n = horizontal and vertical pixel count (e.g. 1920, 1080)

The PSNR is given in decibel units (dB), which measure the ratio of the peak signal and the difference between two images. An increase of 20 dB corresponds to a ten-fold decrease in the RMS (root mean squared) difference between two images. For simplicity, we display 100 when the images are identical. The actual value is infinite.

PSNR measures all of the differences between the original and processed videos. It does not try to weight these. The calculation is very fast and is used to perform QA/QC when the perceived video quality is already known.

Spatial

Spatial measures the activity within a video sequence. Spatial is a no-reference metric. Large values indicate a substantial change within an image - for example: panning stadium crowds would generate a large Spatial Index. A solid color would produce a low Spatial Index. For more information about the Spatial metric, please refer to ITU-T P.910 (a link is on our website at www.videoclarity.com/WhitePapers.html).

$$H_v = \begin{bmatrix} -1 & -2 & -1 \\ 0 & 0 & 0 \\ 1 & 2 & 1 \end{bmatrix}, H_h = \begin{bmatrix} -1 & 0 & 1 \\ -2 & 0 & 2 \\ -1 & 0 & 1 \end{bmatrix}$$

$$SI_v(i,j,n) = Y(i,j,n) \otimes H_v$$

$$SI_h(i,j,n) = Y(i,j,n) \otimes H_h$$

$$SI_r(i,j,n) = \sqrt{SI_v(i,j,n)^2 + SI_h(i,j,n)^2}$$

$$SI_{var}(n) = \frac{1}{P}\sum_i \sum_j (SI_r(i,j,n) - SI_{mean}(n))^2$$

$$SI_{stdv}(n) = \sqrt{SI_{var}(n)}$$

The Spatial Index is the STD deviation, and presented in Pixel Value units, which measure the value difference from one pixel to its neighbors across the image. If two sequences are being played, then the Spatial Index is calculated for both video sequences, and the differences are displayed and graphed. The Log file holds the actual values for both video sequences and the differences.

Temporal

Temporal measures the activity frame-to-frame within a video sequence. Temporal is a no-reference metric. Large values indicate a substantial change occurred during the video sequence - for example: a scene change would generate a large Temporal Index. A frozen frame would generate a Temporal Index of 0. For more information about the Temporal metric, please refer to ITU-T P.910 (a link is on our website at www.videoclarity.com/WhitePapers.html).

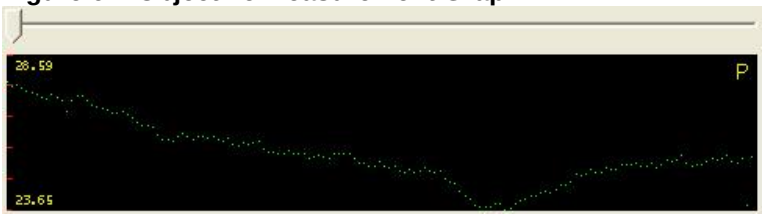
$$TI(i,j,n) = Y(i,j,n) - Y(i,j,n-1)$$

$$TI_{mean}n = 1/P \sum_i \sum_j TI(i,j,n)$$

- $Y(i,j,n)$ represents the luminous value of a pixel in frame(n) at location(i, j).
- The sum of differences is divided by P (the number of pixels in the frame).

The Temporal Index is the STD deviation, and presented in Pixel Value units, which measure the value difference from one pixel across many frames. If two sequences are being played, then the Temporal Index is calculated for both video sequences, and the differences are displayed and graphed. The Log file holds the actual values for both video sequences and the differences.

Figure 61: Objective Measurement Graph



The Objective measurement graph is enabled by pressing the Graph button in the Objective Metric Controls pane. If all of the data has already been collected (which it does by playing through the 2 video sequences the first time after the Objective Metric is turned on), the graph will be displayed as shown above. If the data has not been collected, the Graph button will switch to Graphing mode, and a horizontal line will be drawn across the center of the screen. The video sequences are played from the start through the end points. To change the start and end points, use Clip Alignment to adjust the first and last positions for both Viewports. Once the video sequences have been played, the graph is scaled and the minimum,

maximum, and average Objective Metrics are displayed along with the graph. Using the shuttle bar (slide bar), the user can display any frame to visually assess the 2 video sequences.
Note: The frame is associated with the right side of the slide bar.

Pixel Values

To display individual pixel values press the right mouse button.

Note: the left mouse button will still control panning.

Scrolling to any X,Y location will show the pixel values for the same location for both video sequences. Holding the right button while moving the cursor will allow moving the cursor in increments of 4 pixels at a time.

Note 2: to get finer control of the X,Y location, use the Pixel Value Hotkeys, which increment in 1-pixel increments, or type in an X,Y location in the Pixel Value Controls.
Note 3: you can also type in an X,Y location directly.

Objective Metric Controls

The Objective Metric Control Pane controls the behavior of the AFREQ, APEAK, JND, PEAQ, PSNR, Spatial, and Temporal objective metric, displays the Pixel Values at a chosen location, and sets the A-B parameters.

Figure 62: PSNR Objective Metrics Controls

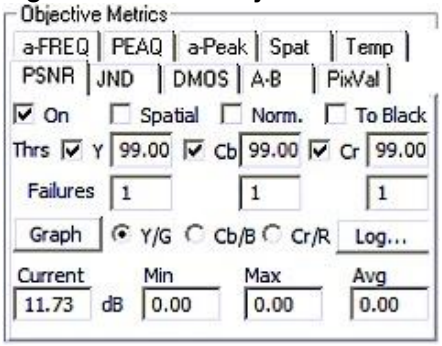


Figure 63: JND Objective Metric

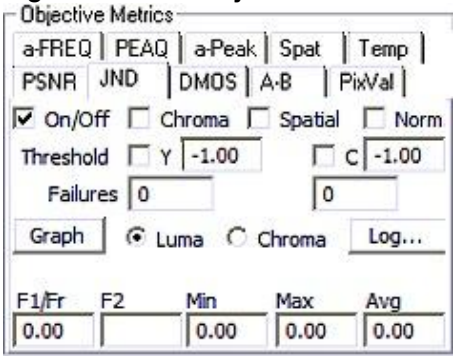


Figure 64: Pixel Value Controls

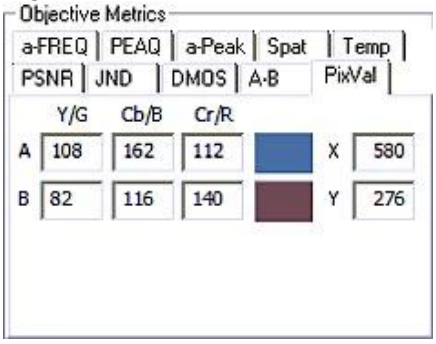


Figure 65: DMOS Objective Metric

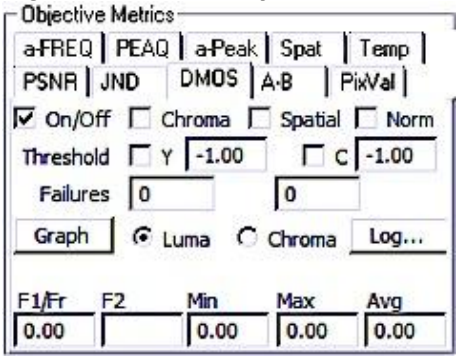


Figure 66: aFreq Objective Metric

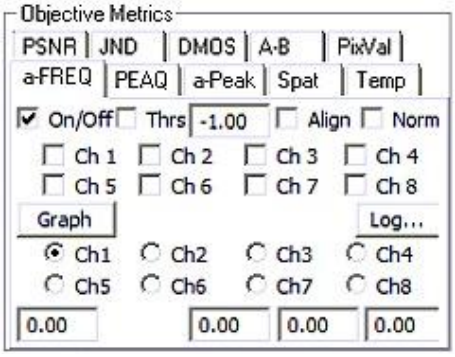


Figure 67: Spatial Objective Metric

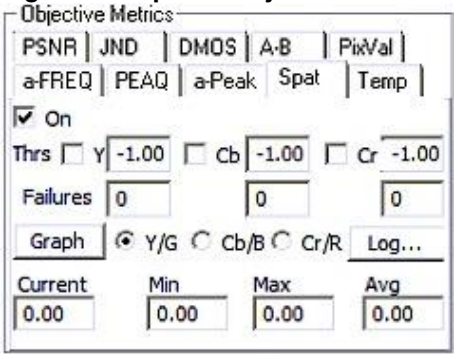


Figure 68: Temporal Objective Metric

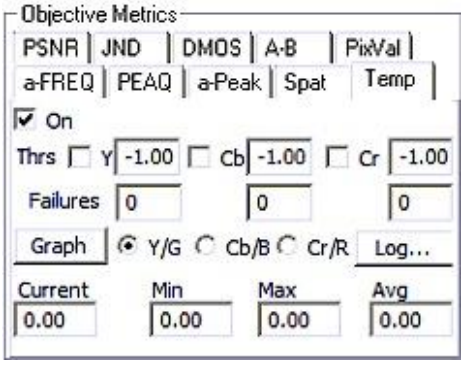


Figure 69: PEAQ Objective Metric

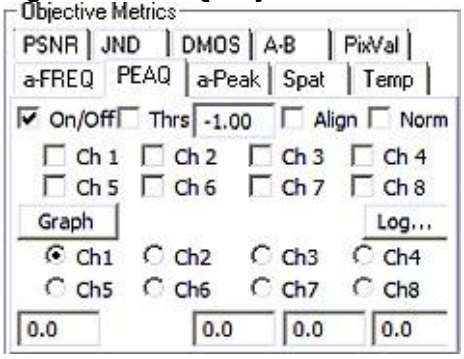


Figure 70: a-Peak Objective Metric

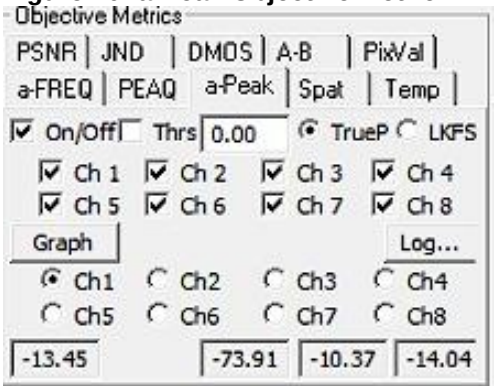


Table 21: Objective Metrics Description

Note: Moving among the Objective Metrics does not turn on or off the metric calculations. This simply displays the collect data.

DMOS	This tab selects the DMOS Metric settings *Note 1: DMOS takes a considerable amount of time so we do not allow moving to another pane while this calculation is processing.* *Note 2: Chroma now enabled for DMOS.*
JND	This tab selects the JND Metric settings *Note 1: JND takes a considerable amount of time so we do not allow moving to another pane while this calculation is processing.*
PSNR	This tab selects the PSNR Metric settings
PEAQ	This tab selects the PEAQ Metric settings *Note 1: Sequence must have audio turned on by clicking on/off box under PEAQ tab. Then click Threshold if desired and enter Threshold value. Align box may be checked if aligning the audio separately from the video before running the metric. A positive offset means audio is lagging behind video. Negative offset means audio running ahead of video. Normal checkbox will normalize channels before running PEAQ metric.* *Note 2: Choose channel you want to run PEAQ metric. Multiple channels may be chosen to run metric test simultaneously. Graph shows metric data in graph window. Button below log creates log file. Channel output data can be selected to view results. Config Button sets parameters for PEAQ: Current Frame, Min Seq, Max Seq & Avg. Seq. are options.* *Note 3: Audio Frequency/PEAQ Metric Silence Threshold should be set to the default value of 0.0020. Audio PEAQ metric scale has dropdown with 2 options – 1387 and 1116. See the PEAQ application note here… http://videoclarity.com/wp-content/uploads/2013/05/PEAQ_Audio-Objective-Testing-in-ClearView.pdf . For PEAQ reference location matters – if B desired, check REF B box. Viewport B is the default.*
aFreq	This tab selects the aFreq Metric settings. *Note 1: Sequence must have audio. Turn on by clicking on/off box under aFreq tab. Then click Threshold if desired and enter Threshold value. Align box may be checked if aligning the audio separately from the video before running the metric. A positive offset means audio is lagging behind video. Negative offset means audio running ahead of video. Normal checkbox will normalize channels before running aFreq metric.* *Note 2: Choose channel you want to run aFreq metric. Multiple channels may be chosen to run metric test simultaneously. Graph shows metric data in graph window. Button below log creates log file. Channel output data can be selected to view results. Config Button has two settings:* • *Audio Frequency Metric Batch Milliseconds: Default setting is 334* • *Audio Frequency Metric Low Pass Threshold: Default setting is 0* *Note 3: Audio alignment can be done with aFreq: this is a simple audio alignment that can be done much faster than PEAQ.*
aPeak	*This tab selects the aPeak settings.* *Note 1: Sequence must have audio. Turn on by clicking on/off box under aPeak tab. Then click Threshold if desired and enter Threshold value. By default tPeak is run.*

	Note 2: Choose channel you want to run aPeak metric. Multiple channels may be chosen to run metric test simultaneously. Graph shows metric data in graph window. Button below log creates log file. *Note 3:To run LKFS instead of aPeak click the LKFS box on. This will run on all audio channels whether they are checked or not. The resulting log file will have .LKFS as the extension.* *Note 4: Within the config window, the parameters Audio Loudness Standard and Timescale will affect the parameters and timescale of this metric for LKFS and True Peak.*
Spatial	This tab selects the Spatial Metric settings *Note 1: If you have 2 video sequences loaded, it will calculate the Spatial for both sequences independently and subtract the difference. The Log file will have 3 sets of data. The Graph will display the subtracted difference.*
Temporal	This tab selects the Temporal Metric settings *Note 1: If you have 2 video sequences loaded, it will calculate the Temporal for both sequences independently and subtract the difference. The Log file will have 3 sets of data. The Graph will display the subtracted difference.*
PixVal	This tab enables you to view individual Pixel Values. Please refer to the Pixel Value Controls for more information.
A Minus B	This tab enables you to set the A-B parameters. Please refer to the A-B Controls for more information
On	This enables/disables calculating the Objective Metrics. When checked, the Metric calculation is enabled. Data is collected while the sequence is playing. To play the sequence, please press the Play, Graph, or Log buttons. When Unchecked, the calculated data is removed from memory.
Spatial	Selecting this applies the spatial alignment calculated in the Metric Adjust pane.
Norm.	Selecting this applies the color hue/luminance intensity offset calculated in the Metric Adjust pane.
Field	Selecting this tells DMOS to process each field separately as opposed to processing the data as 1 frame.
Thrs	This allows a threshold to be set of Y, Cb and Cr. Each component can be turned on/off. PSNR values under this threshold are returned as failures (including Luminance and Chrominance). JND, Spatial, and Temporal values over this threshold are returned as failures. *Note 1: JND, DMOS combine Cb & Cr together so there is only 1 threshold for color.*
Failures	These are informational messages and cannot be changed. It displays the number of frames that are outside the threshold (see not above).
Y/G	Show the Objective Metric data for the Y/G value
Cb/B	Show the Objective Metric data for the Cb/B value
Cr/R	Show the Objective Metric data for the Cr/R value
F1/Fr, F2, Current, min, max, avg	These are informational messages and cannot be changed. Current – the current metric value F1/Fr – the current Sarnoff JND or DMOS metric value for Field #1 or Frame F2 – the current Sarnoff JND or DMOS metric value for Field#2 Min – the minimum metric value Max – the maximum metric value Avg – the average as defined in the appropriate ANSI spec. For PSNR the average is based on T1.TR.74-2001; for DMOS and JND, average is a 4th squared, 4th root minkowski average; for Spatial, Temporal it is a straight

	average.
Graph	Display the Y/G, Cb/B, or Cr/R values over time on the Objective Metric Graph. If the data has not been calculated, then pushing this button will play the video sequences, calculate the Objective Metrics, and display them. *Note 1: Y/G data will be printed in Green. Cb/B data will be printed in Blue. Cr/R data will be printed in Red.* *Note 2: In the upper, right corner, the graph will display A for both PEAQ and AFREQ, D for DMOS, J for JND, P for PSNR, S for SPATIAL, and T for TEMPORAL.*

Log	This creates a log file which includes:
	• Video Sequence Library
	• Video Sequence Name
	• Clip Alignment Parameters
	• Objective Metrics
	  ○ AFREQ
	  ○ DMOS
	  ○ JND
	  ○ PEAQ
	  ○ PSNR
	  ○ SPATIAL
	  ○ TEMPORAL
	
	If the data has not been calculated, then pushing this button will play the video sequences, calculate the Objective Metrics, and write them to the appropriate file. When you press log, you will be prompted to enter a location to save the file along with a filename.
	
	Note 1: You can restore these files using File Import, and ClearView will automatically load the clips, restore the image format, video format, alignment, and read in the Objective Metrics.
	Note 2: Files are written as a 12 column, space-delimitated file.
	• *The first 3 columns are Viewport A's data.*
	• *The second 3 columns are Viewport B's data.*
	• *The third 3 columns are Viewport B's data subtracted from Viewport A's data*
	• *The fourth 3 columns are the results against the threshold (aka pass/fail)*

Table 22: Pixel Value Descriptions

Y/G Cb/B Cr/R A B	These are the pixel values in decimal at the same X,Y location for video sequence A & B. The color is also displayed for reference. *Note 1: if you zoom the original image, then you can see the cursor more clearly.* *Note 2: to get finer control of the X,Y location, use the Pixel Value Hotkeys, which increment in 1-pixel increments, or type in an X,Y location in the Pixel Value Controls.*
X, Y	This is the X, Y location of the current pixel. Pressing the right mouse button enables this mode. *Note: This is referenced within the original image – not the location after the video sequences have been rendered.*

Figure 71: A Minus B Controls

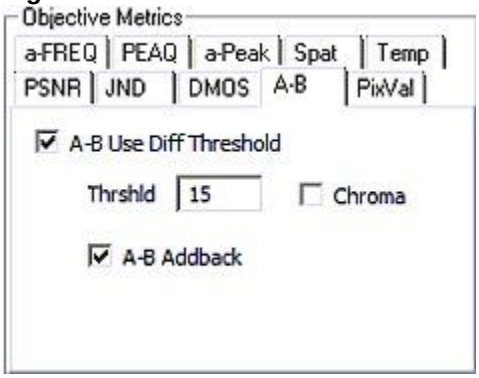


Table 23: A Minus B Descriptions

A-B Use Diff Threshold	Checking this box performs a |A-B| > Threshold on either the Chroma or Y pixels Unchecking this box, performs an A-B > 0 on all pixel values If true, it displays the difference. If false, it displays black
Threshold	This is the threshold value for the A-B Use Diff Threshold above
Chroma	Check means that the A-B calculation will be performed only on the chroma values (Cr & Cb) Uncheck means that the A-B calculation will be performed only on the luminance value (Y)
A-B Addback	Checking this box performs a |A-B| > Threshold calculation. • If (A-B) >= Threshold, a Green pixel is displayed • If (B-A) >= Threshold, a Yellow pixel is displayed • If (((A-B) < Threshold) && ((B-A) < Threshold)), the original video sequence is displayed Unchecking this box displays the results of |A-B| if it is greater than the threshold.

Figure 72: Metric Adjust Controls

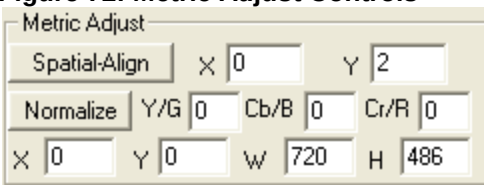


Table 24: Metric Adjust Descriptions

Spatial-Align	Checking this box performs a Spatial Alignment in both the horizontal and vertical direction. The current video frame in Viewport B is compared to the current frame in Viewport A. The results are shown in X, Y. *Note: The video sequence is not adjusted. This offset only applies to the objective metrics.*
X, Y	These are the X,Y offset values after the Spatial-Alignment. They can be overridden. *Note 1: the offsets are restricted to be +/- 8 (X) and +/- 16 (Y).* *Note 2: The values must be even. An odd offset in the Y direction will result in a flipped field in Interlace mode. An odd offset in the X direction will result in a flipped color component in Y'CbCr.* *Note 3: The video sequences are centered after the alignment. To view the results, re-record the video sequences using the Record Pane.*

Normalize	Checking this box performs a Luminance Intensity and Chrominance Hue calculation. The current video frame in Viewport B is compared to the current frame in Viewport A. The results are show in Y/G, Cb/B, Cr/R. *Note: The video sequence is not adjusted. This offset only applies to the objective metrics.* *Note2: The offset is a linear offset per frame and is used to adjust the brightness or color hue.*
Y/G, Cb/B, Cr/R	These are the Y/G, Cb/B, and Cr/R luminance/chrominance offsets after the Normalization.
X, Y, W, H	This allows you to set a window size for the objective metrics. By default it is full screen, but the size can be adjusted. *Note: to remove borders with noise, this tool can be used to exclude the noise.*

Align the Video Sequences

The Clip Alignment Pane allows user control of display speed and defines the first and last frame to be played on either Viewport. This is used to line up similar clips captured at different times, at different frames rates.

For example, ClearView acts as a video server to a compression engine. It then reads the results from the compression engine as a file. The compression engine takes 1-2 seconds to process the first frame and may reduce the frame rate from 30fps to 3fps. ClearView can manually or automatically align the clips, and then play them so that they appear to be playing at the same rate.

Figure 73: Clip Alignment Controls

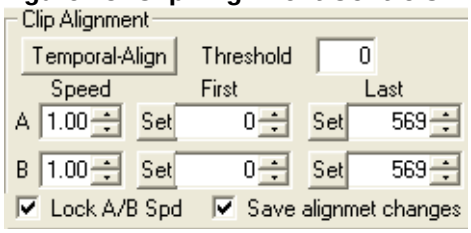


Table 25: Clip Alignment Pane Descriptions

Clip Alignment Speed	This can be set to any value. If you would like to play the sequence at 3fps, and you are outputting at 30fps (or 60 fields per second), then set the speed to 3fps/30fps = 0.1. The thumb wheel moves 1/10th increments, but you can enter a more precise fractional number using the keyboard. We recognize fractional numbers in the Y.XX format. In other words 1 digit before the decimal point, and 2 digits after the decimal point. *Note: Viewport A and B will run at the same speed as long as Lock A/B Spd is checked.*
First	This is the first frame that will play. *Note 1: Viewport A and B are set independently to allow manual alignment of clips* *Note 2: 0 (zero) is the first frame*
Last	This is the last frame that will play. *Note 1: Viewport A and B are set independently to allow manual alignment clips* *Note 2: If you need to reset the Last Frame, set it to 99999 or press backspace/delete, and the software will automatically reset it to the last frame.*
Lock A/B Spd	Checking this sets Viewport B to play at the same rate as Viewport A.

	Unchecking this allows Viewport A and B to operate at different rates. *Note: Viewport A has a video sequence originally compressed at 3fps. Viewport B has the uncompressed video sequence. To play these at the same rate, set Viewport A's Speed to 0.1 and Viewport B's Speed to 1.0, and Uncheck this box.*
Save alignment changes	Checking this saves the changes that you have made to first and last. Next time you use the video associated with Viewport A or B, it will use these first and last frame numbers. *Note: This is normally a good thing, but if you are comparing a reference video to many different encoded video sequences, the first/last frame of the reference may be different for each encoded video sequence. In this case, you should uncheck this box.*
Temporal Align	Pressing this box performs a PSNR on every frame for the Video Sequence associated with Viewport A with respect to the currently displayed frame in Viewport B. If successful, the First frames are set based on the frame numbers of the aligned frames. The Last frames are set to First frame + min (Frames remaining in Viewport A, Frames remaining in Viewport B). *Note 1: While it is performing the auto alignment, this box will change status from Auto Align to Aligning.* *Note 2: To ensure a successful auto align, go to the first non-repeated frame in Viewport B. If there are repeated frames, ClearView will find the first frame.*
Threshold	After the auto alignment is complete, the PSNR between the two aligned frames is checked against this value. If the PSNR is lower than this value, then auto alignment is declared to be unsuccessful, and the first and last frames are not set. *Note 1: This is a safety check just in case no frames are in common between the 2 sequences. If you set this to 0 (zero), then the system will align to the greatest PSNR.* *Note 2: This is only used in RGB mode. In Y'CbCr modes, the Y threshold under the PSNR tab should be used. By using this threshold, you can also apply spatial, normalization, and windowing parameters.*

Note: Please remember to have the same number of frames if you are going to Play the clips in a loop (see the Play Mode pane). Also note that you can deliberately cause errors in the analysis if you play the same clip in both Viewports but the clips are off by as little as 1 frame, especially if there is rapid motion in the clip.

Adjust the Play Properties

Color Space Pane

The Color Space Pane controls how the A-B measurements are calculated and how the color components are displayed.

Figure 74: Color Space Controls

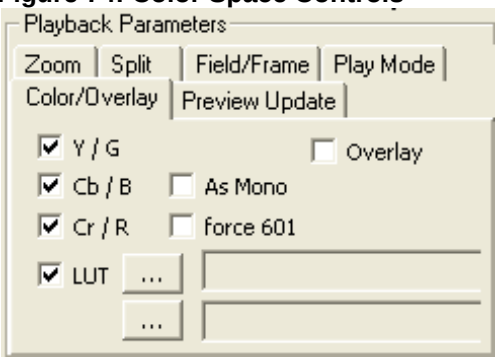


Table 26: Color Space Description

Y/ G **Cr / R** **Cb / B**	Check displays the Y or G. Uncheck turns this color space off Check displays the Cr or R. Uncheck turns this color space off Check displays the Cb or B. Uncheck turns this color space off. Y'CbCr is in Broadcast space; RGB is in Broadcast RGBA or DVI ARGB space.
Overlay	This puts the overlay text over the video sequence. The overlay is a text file which has the same name as the sequence name with a .cvo extension. An overlay file is automatically created with the sequence name inside when you import or record a video sequence. The maximum length of the overlay is 35 characters.
Force 601	Checking this box tells ClearView that the video sequence was encoded using 601 regardless of resolution Unchecking this box, SD uses 601; HD uses 709.
As Mono	Check shows the image in B/W mode. Uncheck: shows all colors.
Gamma / Lookup Table	Check lets you define your own Gamma/Look up table which redefines the values for Y'CbCr or RGB. The file where your own definition exists must be in the format as shown in the LUT example below. 2nd LUT for dual output (when doing output, one can set a separate LUT for each output)
Filename	You can type in the full path and filename or select Browse to find the file *Note: There are many examples under www.videoclarity.com/Support (Miscellaneous Support Files).*

The user can choose to display only the Red (R) in RGB space or the Luminance (Y) in YUV space.

The user can also define a more complex LUT (look-up table). The LUT is a tab delimited file ending in .lut. Several LUT files are provided with the installation. The columns are ordered as R-G-B or Cr-Y-Cb. As an example, a LUT in RGB 8-bit & Y'CbCr 8-bit, which only displays Red would look like the following (*Note: that 0x10 is black for Y and 0x80 is black for Cr and Cb*):

Figure 75: Example of RGB/CrYCb LUT

R	G	B	Cr	Y	Cb
0	0	0	0	16	128
1	0	0	1	16	128
.	.	.	.	.	.
254	0	0	254	16	128
255	0	0	255	16	128

A 10-bit color space would have 1024 entries and values up to 1024. When using an A-B mode without Addback it is advised to use a LUT that spreads the small pixel values over a larger range.

Preview Update Pane

The Preview Update pane (at the top right corner of the GUI screen) controls the refresh of the preview displayed in the center of the ClearView GUI.

Note 1: This preview display is never updated faster than 30Hz so you should never rely on it as your only output.
Note 2: The preview is also decimated both horizontally and vertically. You cannot trust the image quality in this window.

Figure 76: Preview Update Controls

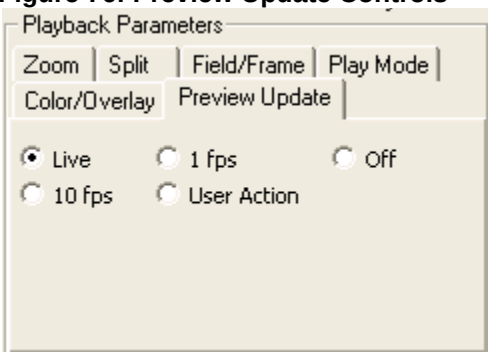


Table 27: Preview Update Descriptions

Live	Updates the Preview Window at up to 30fps *Note: all of these modes only affect the Preview Window. They have no affect on the hardware output. The Preview Window is decimated as we are only showing 1 in 4 pixels horizontally and vertically.*
1 fps	Updates the Preview Window at 1fps
10 fps	Updates the Preview Window at 10fps
User Action	Updates the Preview Window when the user clicks the mouse hits enter, etc.
Off	Does not update the Preview Window

Split Pane

The Split pane controls the way that Viewports A and B are displayed.

Figure 77: Split Controls

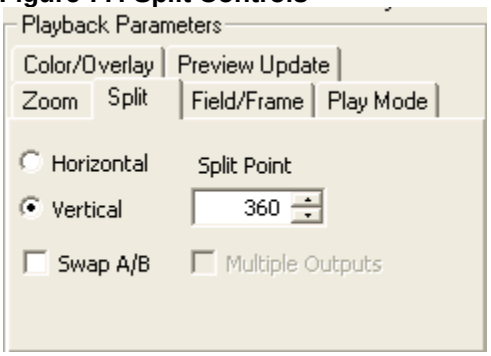


Table 28: Split Pane Descriptions

Horizontal	Viewport A is displayed on top, Viewport B on the bottom
Vertical	Viewport A is displayed on the left, Viewport B on the right
Split Point	This changes the pixel number where Viewport A ends and Viewport B begins
Swap A/B	Show the video sequence assigned to A on Viewport B and visa-versa (for example, show clip A on the right and clip B on the left). The effect in A-B

	modes is that the math turns into B-A. *Note: This gets very confusing. It is better to simply reload the sequences.*
Multiple Outputs	Checking this sends Viewport A to one SDI output and Viewport B to the other. Note 1: This mode works only with the CV-SDI-IO-DL module or with the ClearView Extreme with 2 Broadcast I/O modules Note2: This only works if the View mode is A-only or B-only.

Zoom Pane

The Zoom Pane allows integer-based, pixel replication zoom in both X and Y.

Figure 78: Zoom Controls

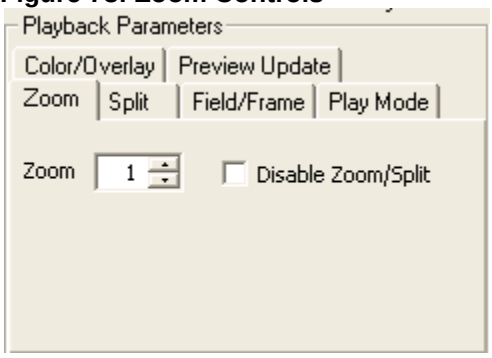


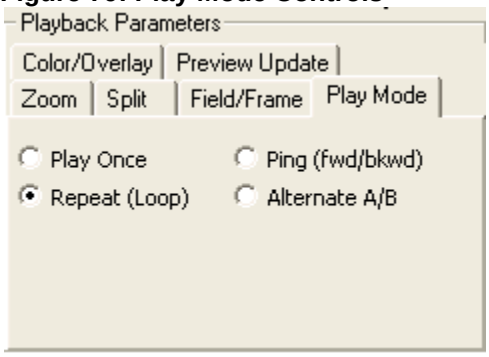
Table 29: Zoom Pane Descriptions

Zoom	Zoom is a global parameter and effects both Viewport A and Viewport B. This is an integer-based zoom. No pre-processing is done as ClearView does not affect the video quality. *Note: Zooming in/out can also be done with the mouse wheel. Move the mouse to the center-point for the zoom, and roll the mouse roller in/out. Use the left mouse button to pan and the roller to zoom +/-.*
Disable Zoom/Split	Disable Zoom/Split returns the system to single stream mode. *Note 1: This mode is used to run in ultra-high frame rate/resolution mode as it directly connects the file system (or memory) to the input buffer of the output module (DVI or Broadcast I/O).* *Note 2: This effectively removes zoom, split, color space, PSNR, (i.e., everything). It should only be used if told to by a Video Clarity Sales/Support Engineer.*

Play Mode Pane

The Play Mode pane controls whether the clip is played 1x, forever in a loop, or forward then backward repeatedly. The Alternate A/B plays sequence A, then sequence B repeatedly.

Figure 79: Play Mode Controls



Field/Frame Mode Pane

The Field/Frame Mode pane allows various options for viewing fields and frames. This is mainly used for interlaced material. These options are independent for Viewport A and Viewport B.

Figure 80: Field/Frame Mode Pane

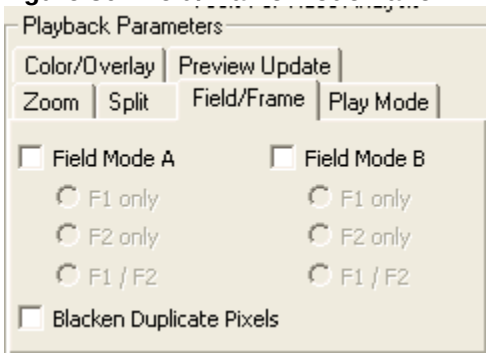


Table 29: Zoom Pane Descriptions

Field Mode A	This has 3 radial button choices: • F1 only: This plays field 1 when displaying field 1 and field 1 when displaying field 2. In other words, it plays field 1 for both fields. • F2 only: This plays field 2 when displaying field 1 and field 2 when displaying field 2. In other words, it plays field 2 for both fields. • F1/F2: This plays field 1 when displaying field 1 and field 2 of frame 1. Then plays field 2 when displaying field 1 and field 2 of frame 2. *Note: Blacken Duplicate Pixels turns off the other field so F1 only means field 1 when displaying field 1 and black when displaying field 2. F2 only means black when displaying field 1 and field 2 when displaying field 2.*
Field Mode B	This has 3 radial button choices: • F1 only: This plays field 1 when displaying field 1 and field 1 when displaying field 2. In other words, it plays field 1 for both fields. • F2 only: This plays field 2 when displaying field 1 and field 2 when displaying field 2. In other words, it plays field 2 for both fields. • F1/F2: This plays field 1 when displaying field 1 and field 2 of frame 1. Then plays field 2 when displaying field 1 and field 2 of frame 2.

	Note: Blacken Duplicate Pixels turns off the other field so F1 only means field 1 when displaying field 1 and black when displaying field 2. F2 only means black when displaying field 1 and field 2 when displaying field 2.
Blacken Duplicate Pixels	This displays black for the field that is being duplicated above. Please read the note sections above.

HotKeys Pane

The HotKeys pane allows the user to set various parameters and to see some attributes about the system.

Figure 81: HotKeys Controls

Table31: HotKeys Control Descriptions

Drop	This indicates if any frames have been dropped. There are 2 numbers and they relate to where the frame was dropped.
Config	This lets you set various general parameters for the ClearView. These settings are saved globally.
Hotkeys	This lets you set various keystrokes to do repetitive actions. These settings are saved globally.
fps	This is the measured frame rate.
Reset	This restores ClearView to the startup state
Exit	This exits ClearView (as does the X at the top of the screen and the ESC key)

Figure 82: Configuration Settings

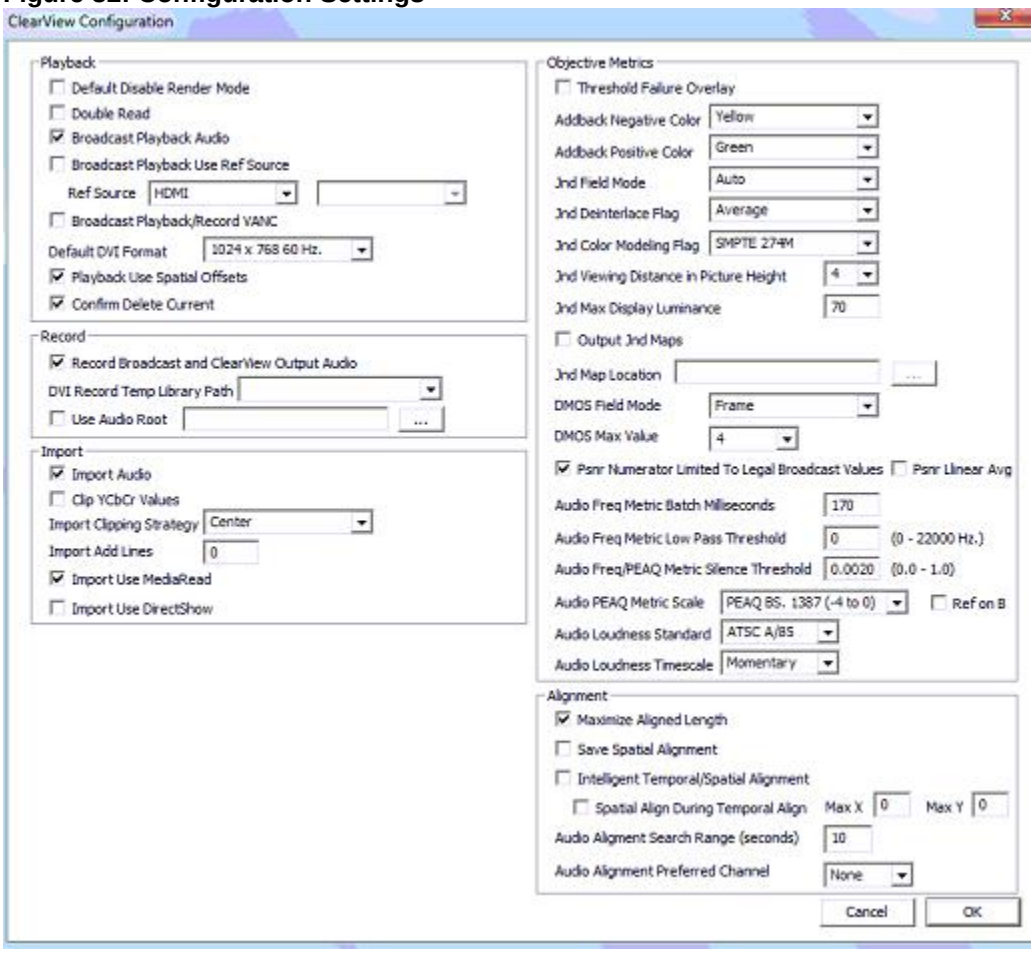


Table 32: Configuration Setting Descriptions

Playback	• Broadcast Playback – Use Reference Source checkbox to choose a reference source for your broadcast boards. These are the default playback parameters for both broadcast and DVI. You may want to change the default broadcast audio playback (turning it on or off if you have audio), broadcast playback/record with VANC (turning it on or off if you want to include the VANC which is a bigger raster than without VANC, default DVI format which is the native format that the DVI monitor accepts so that it can be restored if the EDiD codes are not acknowledged, and Playback using spatial offsets (turning this on automatically shifts the image during playback to show you the offsets as you adjust them or as you allow the automatic algorithm to work). *Note: The others items in this group should be checked only after talking to Video Clarity customer support.*
Record	You can change the default broadcast audio record setting (turning it on or off during record) and you can place the audio in a different directory than the default library where the audio is placed. You may need to change the default directory if instructed by a video clarity customer support professional.
Import	This lets you import audio. It should be on by default.

	It changes where we place the video sequence if the raster size is larger than the video sequence. It changes where we start the video sequences if the raster size is smaller than the video sequences. *Note: The others items in this group should be checked only after talking to Video Clarity customer support.*

Objective Metrics	• Threshold Failure Overlay – Places the text *Failure* in an overlay on the video when the threshold is passed.
	• Addback Negative Color – When B-A > Threshold in Addback mode, we show the pixel in a color. The default color is Yellow. You can change this.
	• Addback Positive Color – When A-B > Threshold in Addback mode, we show the pixel in a color. The default color is Green. You can change this.JND Field Mode – This should be set to Auto which allows the system to do the right thing. For interlaced video sequences, the field mode should be field. For progressive video sequences, the field mode should be frame. If you override this, then you may want to set the Deinterlace flag below.
	• JND Deinterlace Flag – If you are calculating interlaced data in frame mode, then you need to choose a de-interlace method. In general, you should use JND Field Mode = Auto.
	  ○ Average - averages to the top field and bottom field
	  ○ Duplicate - duplicates the top field when active or the bottom field when active
	  ○ Hybrid Average - Creates a new line that is 1/4 of the summation of the top and bottom fields
	  ○ Median - calculates the median average as opposed to the arithmetic average above
	• JND Color Modeling Flag – This is automatically set based on whether we are in HD or SD. This is an override.
	  ○ SMPTE274M - HD Color Mode (default)
	  ○ SMPTE240M - SD Color Mode
	  ○ EBU-625/50 - European Color Mode
	• JND Viewing Modes in Picture Heights – This is how far the human tester was standing away from the display. JND has two defined distances based on the ANSI specification 2x (Expert) and 5x (Normal). Measure the height of the display and stand either 2x or 5x the height from the display. Video Clarity interpolated the results to achieve 3, 4, and 6x
	• JND Max Display Luminance – This is the luminance of the viewed display.
	• Output JND Maps – This check box enables JND display maps to be written to disk. The maps give an indication of what the algorithm “saw” when calculating the metrics. It is useful for figuring out why the score is the score for video processing vendors.
	• JND Map Location – This is where the map files are stored on the hard disk array. The files are viewed using a command line program called vpseqw32.exe.
	• DMOS Field Mode – This should be set to Auto which allows the system to do the right thing. For interlaced video sequences, the field mode should be field. For progressive video sequences, the field mode should be frame. You can override this.
	• DMOS Max Value – DMOS is a scale from 0 (perfect) to X (very poor). The X is normally 4, but it can be 7 or 10. This sets the value to 4, 7, or 10. The numbers are linearly equivalent as we are using 4 digits of accuracy after the decimal place.
	• PSNR Numerator Limited to Legal Broadcast Values – The PSNR numerator is the maximum legal value. Normally, this is set to 255 for 8-bit

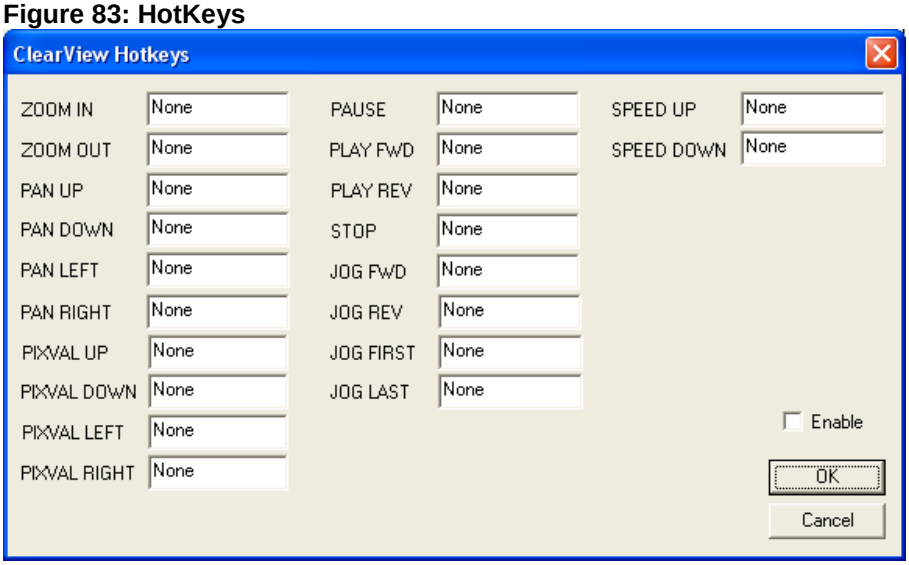
	and 1023 for 10-bit. ANSI suggests using 235 for 8-bit and 940 for 10-bit, which is the setting used if you select this option. • PSNR Linear Average – Setting this feature changes the average from a quadratic average to a linear average. • Save Spatial Alignment – Setting this feature saves the temporal/spatial alignment with respect to the sequence in Viewport B. So if you change the sequence in Viewport A we will still keep the spatial changes saved. Previously if changed Viewport A the spatial offsets would be lost. This would be used if the reference was always the same but the processed clip changed, say at different bit rates or different encoders. • Intelligent Alignment – Setting this feature instructs system to look through every frame in Viewport B and finds any frame that has high temporal change and looks for a match for that frame in Viewport A. Do this for two frames to calculate offset to make sure alignment is the same. In addition spatial align during temporal align checkbox may be used and set x and y parameters desired. • Audio Loudness Standard - Setting the audio loudness standard for a-Peak o ATSC A/85 o EBU R 128 o ARIB TR-B32 o NAB T032 • Audio Loudness Timescale - Setting the timescale for a-Peak o Momentary Loudness - 125 ms timescale for ATSC A/85 and 400 ms for the other standards. o Short Term Loudness - 10 second timescale for ATSC A/85 and 3 seconds for the other standards. o Integrated Loudness - a variable timescale from 1 to 60 seconds for all standards.

Maximize Align Length

Maximize Align Length – Setting this should be done with caution. After calculating the temporal alignment with this set, the first and last frames will be adjusted to the maximum number of frames in the video sequences. For example if the video sequence in Viewport A has 10 frames and the video sequence in Viewport B has 20 frames. If the Alignment is sequence A's frame 5 is the same as sequence B's frame 10. The Viewport A's first will be set to 0 and last to 9. Viewport B's first will be set to 5 and last to 14.

Note: If the videos do not match before the alignment point, there is a possibility that the sequences will be misaligned at the start after the alignment.

Figure 83: HotKeys



To change a Hotkey (aka keyboard shortcut), place the mouse in the space next to the function and type the keyboard sequence. Please remember that the keyboard sequence must begin with Ctrl or Alt. After changing the Hotkey, press OK. It will be saved for future use.
Note: Enable is set off by default so HotKeys are not active. You need to enable them.

FPS is the current frame rate.

Reset restores ClearView to its state when first entered. It removes the video sequences from memory as well.

Exit causes the ClearView application to quit.

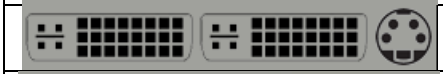
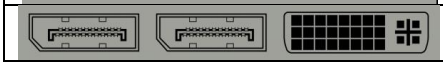
ClearView Hardware Configurations

Each ClearView product model has a specific IO configuration based on model configuration and specifications available at the time of purchase. There are several potential IO configurations that have been developed which are supported for the life of your product.

The following section is dedicated to describing the function and format support for each currently available interface module and module combinations along with the most recent legacy interfaces available within the last five years of this publication.

Hardware Modules

Table 33: Hardware Modules

	CV-SDI-IO-4K
	CV-SDI-IO-LHI
	CV-SDI-IO-CVD (Legacy product)
	CV-SDI-IO-CVD22
	CV-SDI-IO-DL (Legacy product)
	CV-DVI-O (Legacy product)
	CV-DP/DVI-O

CV-SDI-IO-4K

Figure 85: CV-SDI-IO-4K Broadcast I/O Module.

The CV-SDI-IO-4K module records and plays HD/SD and 4K resolution video with embedded audio.

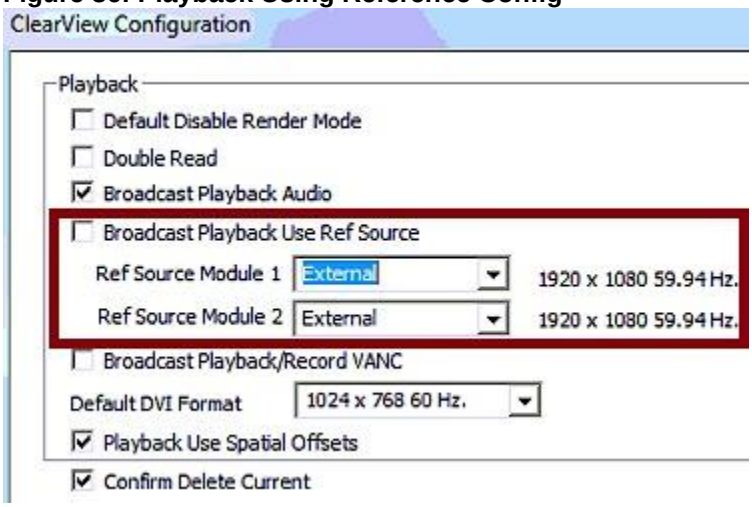
For systems delivered with a supplied sync generator, one IO module is capable of 4K format frame rates of 23.98, 24, and 25 while two modules are used in tandem for these lower rates and higher frame rates, including 29.97, 30, 50, 59.94 and 60. For these systems it is also necessary to feed a reference signal to each CV-SDI-IO-4K by using a tri-level sync generator fed to the reference input on both of the supplied breakout cables. Each breakout cable harness has a BNC labeled "Ref In" which should be connected to the supplied GEN10 reference generator and each 4K interface Breakout connector.

Those systems delivered without a supplied sync generator, May 2014 or later, have the ability to play back all rates of 23.98, 24, 25, 29.97, 30, 50, 59.94 and 60 from the left side module with input recording of all frame rates to the right side module.

Note: There is no Analog 4K output or input format, so the analog breakout is generally only used for its reference input in order to genlock the two boards during playback of 4K formats. Analog IO may be used to alternatively input or output supported SD and HD formats as required.

ClearView stores and plays video data as 100% uncompressed 8 or 10-bit 4:2:2 Y'CbCr.

Figure 86: Playback Using Reference Config



Below are the different configurations of the switches (taken from the Gen10 manual) on the back of the AJA Gen10 which is the supplied sync source for dual 4K board ClearView models. This section does not apply to systems delivered without a sync generator, from May 2014 and beyond.

Figure 87: AJA Gen10 Format Table from AJA documentation:

Table 1. Selection Matrix For Switches 6, 7 and 8

The following table shows the combinations of DIP switch settings required to configure various formats. To use the table, first locate the video format you want in the colored columns and then set switches as shown in the corresponding left hand gray column.

Note: the switches numbers and labels are both shown on the chart, with the labels in parentheses (for example, switch 4 is labelled "FORMAT" and switch 8 is labelled "S3").

SW 4 (FORMAT)			59.94		50	
SW 5 (HD FMT)			1080	720	1080	720
SW8 (S3) - SW7 (S2) -SW6 (S1): These three switches form a binary value shown in the left hand column below. A "0" = switch LEFT, a "1" = switch RIGHT.						
SW8 (S3)	SW7 (S2)	SW6 (S1)				
0	0	0	1080i59.94	720p59.94	1080i50	720p50
0	0	1	1080psf23.98	720p23.98	1080i50	720p25
0	1	0	1080p23.98	720p23.98	1080p25	720p25
0	1	1	1080p29.97	720p29.97	1080p25	720p25
1	0	0	1080i60	720p60	1080i50	720p50
1	0	1	1080psf24	720p24	1080i50	720p25
1	1	0	1080p24	720p24	1080p25	720p25
1	1	1	1080p30	720p30	1080p25	720p25

Note: for 1080psf29.97 use 1080i59.94
for 1080psf30 use 1080i60
for 1080psf25 use 1080i50

ClearView Extreme-4K: Two Board Input/Output – Pre May 2014

Playing or recording 4K is provided up to 60Hz in by using two CV-SDI-IO-4K modules or "Two Boards". The Formats displayed in dual board 4K systems are listed in the GUI pulldown as "**2x2x1920x1080**" to indicate that the quadrants of a 3840X2160 image format are tiled 2x2. Each tile is carried by one 3G HDSDI input or output in a shared configuration between the two interface boards.

The **2X2X1920x1080 Format** is used in ClearView in order to play or record 4K sequences from two broadcast boards for all frame rates available including **23.98, 24, 25, 29.97, 30, 50, 59.94 and 60 fps**. These formats will appear when "**Broadcast Output Module 1 & 2"** is selected. Likewise, these formats will appear on the Broadcast tab for record functions.

When facing the back of the machine:
The **lower two tiles** of the 4K image come in or out of the module on the **left side (Board 2)**, and the **upper two tiles** of the image come in or out of the module on the **right hand side (Board 1)**. See figure 88 below for inputting or outputting "2X2X1920X1080".

Figure 88:

Module on LEFT (Board 2)	Module on RIGHT (Board 1)
In1 = Lower Left	In1 = Upper Left
In2 = Lower Right	In2 = Upper Right
Out3 = Lower Left	Out3 = Upper Left
Out4 = Lower Right	Out4 = Upper Right

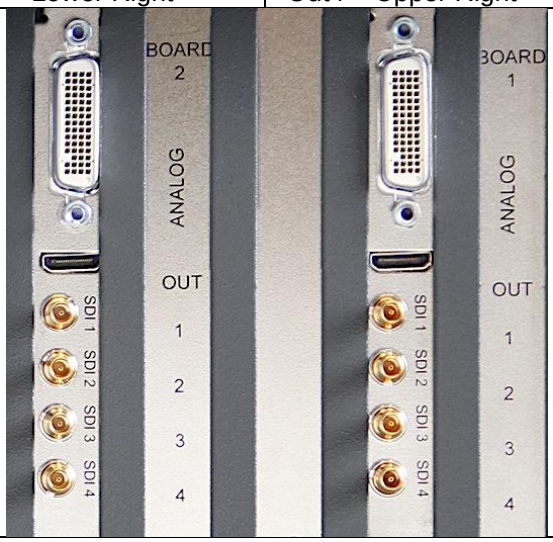


Figure 89:
Single Module 4K output or input

1 = Upper Left
2 = Upper Right
3 = Bottom Left
4 = Bottom Right

ClearView Extreme-4K: One Board Input/Output – Pre May 2014

When selecting "**Broadcast Module 1"** or "**Broadcast Module 2**", the formats displayed in the pull down menu show single module 4K play or record. Playing or Recording 4K with one (or the other) broadcast module is only available up to 25 Hz. For example, "**4x1920x1080**" is the **Format** to select in ClearView to play out or record using a single broadcast board at **23.98, 24** or **25 fps (for systems sold before May 2014 requiring a sync generator)**.

As in figure 89 above tiled sections for a QuadHD 3840X2160 (4K) sequence output or input are HDSDI (1) is Upper Left, (2) Upper Right, (3) Bottom Left, (4) Bottom Right. **Unlike dual board configurations, single board Quad connections are automatically synchronized for playback to a Quad/HD monitor with four 3G HDSDI inputs and are not requiring a reference input.**

Notes: The output configurations are for single or dual picture modes such as side-by-side view on one monitor. One HDMI converter per HDSDI may be used for Quad HDMI monitors or a Quad/HD to HDMI converter for a single HDMI input monitor may be used. Also, the native HDMI connector is for output only and supporting up to 1920X1080P @ 60Hz (no 4K formats in above model configurations only).

ClearView Extreme-4K: Two Board Input/Output – Post May 2014

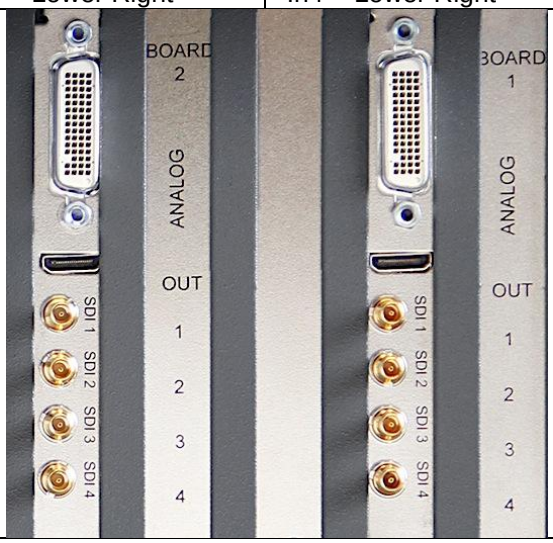
Playing or recording 4K in a system delivered post May 2014 is provided up to 60Hz rate by using one of the two CV-SDI-IO-4K back panel modules. The Formats displayed in the GUI pulldown as "**4x1920x1080**"are used. To record video select "**Broadcast Module 1" which is the module on the right** and to playback video select "**Broadcast Input Module 2" which is the module on the left.** Each tile of the 4K image is carried by one 3G HDSDI for input or output on either the left (output) or right (input) interface boards.

As in figure 90 below tiled sections for a QuadHD 3840X2160 (4K) sequence output or input are HDSDI (1) is Upper Left, (2) Upper Right, (3) Bottom Left, (4) Bottom Right. **Unlike dual board configurations, single board Quad connections are automatically synchronized for playback to a Quad/HD monitor with four 3G HDSDI inputs or for recording from a source input and are not requiring a reference input.**

When facing the back of the machine:
The **left module is used for playback with tiled 4K image configured as outlined in Figure 90** of the 4K image out of the system. The **right module is used for record with tiled 4K image configured as outlined in Figure 90.**

Figure 90:

Output Module on LEFT	**Input Module on RIGHT**
Out1 = Upper Left	In1 = Upper Left
Out2 = Upper Right	In2 = Upper Right
Out3 = Lower Left	In3 = Lower Left
Out4 = Lower Right	In4 = Lower Right



Recording or playing HDTV or SDTV formats using a 4K system:
By choosing either Broadcast Input Module 1 or Broadcast Input Module 2 under the Broadcast record tab as Single Input, Dual Input or Input/Output and also any playback function, the input/output mapping either Board 1 or Board 2 is as follows.
SDI 1 = Input 1
SDI 2 = Input 2
SDI 3 = Output 1
SDI 4 = Output 2

Notes:

1. The above photo shows right side labeled panels which are only for directional purposes of this manual. The delivered systems house vented panels in place of those extra labeled panels shown.

2. 4K formats are not supported via analog IO, therefore analog breakout interfaces are only for HD or SD format play and record.
3. In all configurations, one HDMI converter per HDSDI may be used for Quad HDMI monitors or a Quad/HD to HDMI converter for a single HDMI input monitor may be used.
4. Also, the native HDMI mini connector is for output only and supporting up to 3840X2160P @ 30Hz, 4:2:2 in the Post May 2014 model configurations.

CV-SDI-IO-4K Capture & Playback Standards

Digital Video Inputs & Outputs
- 4 BNC input/output programmable for 259/292/296/424/425a/425b and 4K/Quad HD
- 8 or 10 bits per component
- 1-channel v-1.4 HDMI output (1080p60Hz limited)
- 3G, HD-SDI, SD-SDI I/O

Analog Video Inputs & Outputs (on supplied breakout cable)
- 12-bit HD Analog Component I/O
- 12-bit SD Analog Component/Composite/S-Video I/O

Digital Audio Inputs & Outputs
- 8-ch SDI Embedded Audio I/O, 20-bit 48KHz
- 8-ch HDMI Embedded Audio Output, 20-bit 48KHz

I/O Format

Standard Definition (SD)
- 525i 59.94 Hz
- 625i 50 Hz

High Definition (HD)
- 720p: 50Hz, 59.94Hz, 60Hz
- 1080i: 50Hz, 59.94Hz, 60Hz
- 1080psf: 23.98Hz, 24Hz
- 1080p: 23.98Hz, 24Hz, 25Hz, 29.97Hz, 30Hz, 50Hz, 59.94Hz, 60Hz
- 3840X2160p: 23.98Hz, 24Hz, 25Hz, 29.97Hz*, 30Hz*, 50Hz*, 59.94Hz*, 60Hz*
- *these rates only supported on dual 4K IO configured models

CV-SDI-IO-LHI

Figure 91: CV-SDI-IO-LHI Broadcast I/O Module.

The CV-SDI-IO-LHi module records and plays HD/SD videos. It is capable of 1080P/60Hz record and/or playback. ClearView stores the video data as 100% uncompressed 8/10-bit 4:2:2 Y'CbCr. The inputs and outputs are any of HDMI, HD-SDI, Component, Composite, or S-Video.

CV-SDI-IO-LHI Capture & Playback Standards

Digital Video Inputs & Outputs
- 259/292/296/424/425a/425b
- 8 or 10 bits per component
- 2-channel v-1.3a HDMI I/O

- 3G, HD-SDI, SD-SDI I/O

Analog Video Inputs & Outputs
- 12-bit HD Analog Component I/O
- 12-bit SD Analog Component/Composite/S-Video I/O

Digital Audio Inputs & Outputs
- 2-ch Balanced XLR AES I/O, 24-bit 48KHz
- 8-ch SDI Embedded Audio I/O, 20-bit 48KHz
- 2-ch HDMI Embedded Audio I/O, 20-bit 48KHz

Analog Audio Inputs & Outputs
- 2-ch Balanced XLR Analog Audio I/O, 24-bit 48KHz

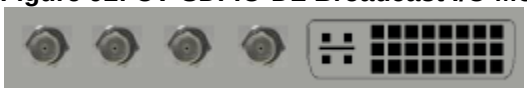
I/O Format

Standard Definition (SD)
- 525i 59.94 Hz
- 625i 50 Hz

High Definition (HD)
- 720p: 50Hz, 59.94Hz, 60Hz
- 1080i: 50Hz, 59.94Hz, 60Hz
- 1080psf: 23.98Hz, 24Hz
- 1080p: 23.98Hz, 24Hz, 25Hz, 29.97Hz, 30Hz, 50Hz, 59.94Hz, 60Hz

CV-SDI-IO-DL

Figure 92: CV-SDI-IO-DL Broadcast I/O Module



CV-SDI-IO-DL Capture Standards

ClearView captures HD/SD digital data directly from VTRs, cameras, telecines, film scanners, or any other device. The data is stored as 100% uncompressed 8/10-bit data within ClearView.

Digital Video Inputs
- 2 X BNC - 75 Ohm
- SD-SDI / HD-SDI selectable
- Conforms to SMPTE 259/292/296M
- 8 or 10 bits per component
- 4:2:2 SD/HD-SDI Single-Link
- 4:4:4 HD-SDI Dual-Link

Analog Video Inputs
- 3 X BNC - Component (Y'Pb'Pr or RGB)
- 1 X BNC - Composite (Shared with Component BNC connections)
- 2 X BNC – Y/C composite input (Shared with Component BNC connections)
- 10-bit D/A

Digital Video Outputs
- 2 X BNC - 75 Ohm
- SD-SDI / HD-SDI selectable
- Conforms to SMPTE 259/292/296M
- 8 or 10 bits per component
- 4:2:2 HD-SDI, SDI Single-Link

- *4:4:4 HD-SDI Dual-Link or dual 4:2:2 HD-SDI, SDI Single-Link*

Analog Video Output
- 3 X BNC - Component (Y'Pb'Pr or RGB)
- 1 X BNC - Composite (Shared with Component BNC connections)
- 2 X BNC – Y/C composite input (Shared with Component BNC connections)
- 10-bit D/A

Input Formats
- 525i 59.94 Hz
- 625i 50 Hz
- 720p (50, 59.94, 60) Hz
- 1080i (50, 59.94, 60) Hz
- 1080psf (23.976, 24) Hz
- 1080p (23.976, 24, 25, 29.97, 30, *50, 59.94, 60*) Hz
- *2048x1080p (23.98, 24) Hz*
- *2048x1080psf (23.98, 24) Hz*
- *2048x1556psf (14.98, 15) Hz*

Output Formats (*independent from Input*)
- 525i 59.94 Hz
- 625i 50 Hz
- 720p (50, 59.94, 60) Hz
- 1080i (50, 59.94, 60) Hz
- 1080psf (23.976, 24) Hz
- 1080p (23.976, 24, 25, 29.97, 30, *50, 59.94, 60*) Hz
- *2048x1080p (23.98, 24) Hz*
- *2048x1080psf (23.98, 24) Hz*
- *2048x1556psf (14.98, 15) Hz*

CV-SDI-IO-CVD
Figure 93: CV-SDI-IO-CVD Broadcast I/O Module.

The CV-SDI-IO-CVD module records, plays or simultaneous records and plays HD/SD videos. It is capable of 1080i/60Hz record and/or playback. ClearView stores the video data as 100% uncompressed 8/10-bit 4:2:2 Y'CbCr.

CV-SDI-IO-CVD Capture & Playback Standards
Digital Video Inputs & Outputs
259/292/296/424
8 or 10 bits per component
3G, HD-SDI, SD-SDI I/O

Digital Audio Inputs & Outputs
8-ch SDI Embedded Audio I/O, 20-bit 48khz

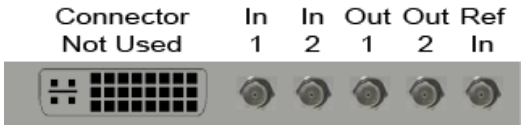
I/O Format
Standard Definition (SD)
525i 59.94 Hz
625i 50 Hz

High Definition (HD)

720p: 50Hz, 59.94Hz, 60Hz
1080i: 50Hz, 59.94Hz, 60Hz
1080psf: 23.98Hz, 24Hz
1080p: 23.98Hz, 24Hz, 25Hz, 29.97Hz, 30Hz

CV-SDI-IO-CVD22

Figure 94: CV-SDI-IO-CVD22 Broadcast I/O Module



The CV-SDI-IO-CVD22 module records, plays or simultaneous records and plays HD/SD videos. It is capable of 1080p/60Hz record or playback with up to eight channels of embedded audio. Record or play two simultaneous signals up to 1080i/60Hz with eight channels of audio each or play while record up to this signal format or lower rate formats. ClearView stores the video data as 100% uncompressed 8/10-bit 4:2:2 Y'CbCr.

CV-SDI-IO-CVD22 Capture & Playback Standards

Digital Video Inputs
- 2 X BNC - 75 Ohm
- 3G/HD/SD-SDI auto sense
- Conforms to SMPTE 259/292/296/424
- 8 or 10 bits per component
- 4:2:2 SD/HD-SDI
- Analog video inputs not supported directly by this module, use external conversion

Audio Inputs
- 8 channels SDI embedded, 48kHz synchronous

Digital Video Outputs
- 2 X BNC - 75 Ohm
- 3G/HD/SD-SDI auto sense
- Conforms to SMPTE 259/292/296/424
- 8 or 10 bits per component
- 4:2:2 HD-SDI, SDI Single-Link
- Input or output dual 4:2:2 HD-SDI (up to SMPTE-292M on both)
- Analog video outputs not supported directly by this module, use external conversion

Digital Audio Output
- 8 Channels SDI embedded, 48kHz synchronous

Input Formats
- 525i 59.94 Hz
- 625i 50 Hz
- 720p (50, 59.94, 60) Hz
- 1080i (50, 59.94, 60) Hz
- 1080psf (23.976, 24) Hz
- 1080p (23.976, 24, 25, 29.97, 30, *50, 59.94, 60*) Hz
- *2048x1080p (23.98, 24) Hz*
- *2048x1080psf (23.98, 24) Hz*
- *2048x1556psf (14.98, 15) Hz*

Output Formats (*independent from Input*)

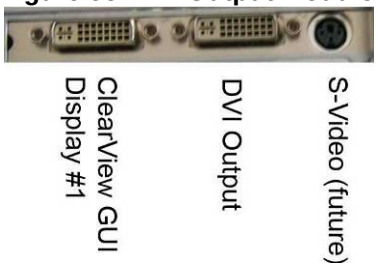
- 525i 59.94 Hz
- 625i 50 Hz
- 720p (50, 59.94, 60) Hz
- 1080i (50, 59.94, 60) Hz
- 1080psf (23.976, 24) Hz
- 1080p (23.976, 24, 25, 29.97, 30, *50, 59.94, 60*) Hz

CV-DVI-O

Plays 100% uncompressed DVI digital video and VGA analog video. The DVI/VGA Output Module can create custom video raster formats; it is completely programmable to any video with a pixel clock less than 400MHz.

The DVI/VGA Output Module is a direct video output intended for direct connection to your video display device. It communicates with your display using EDID codes. While the DVI/VGA Output Module can generate many output rates, your display may not support your settings. In this instance, the ClearView system will inform you of the display problem, and will ask you to choose a different display resolution/rate.

Figure 95: DVI Output Module



CV-DVI-O Playback Standards

DVI Digital Video Outputs

- DVI-D 1.0 Compliant (2 outputs)
- Pixel Sampling: 4:4:4, RGB
- 8-bits per component

VGA Analog Video Outputs

- HD-15 Female (via Adapter)
- Pixel Sampling: 4:4:4, RGB
- 8-bits per component

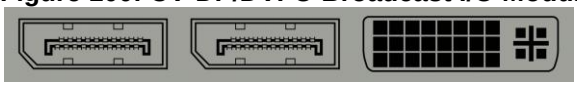
Video Formats

- 640 x 480 @ 60/120fps
- 720 x 480 @ 60/120fps
- 720 x 576 @ 50/100fps
- 800 x 600 @ 60/120fps
- 1280 x 720 @ 50/60/100/120fps
- 1600 x 1200 @ 60/72/85fps
- 1920 x 1080 @ 50/60/100/120fps

Note: In addition to the formats listed above, other formats can be custom created. Parameters include front-porch, back-porch, sync-tip, pixels-per-line, lines-per-frame, etc.

CV-DP/DVI-O

Figure 100: CV-DP/DVI-O Broadcast I/O Module.



DP Out 1 **DP Out 2** **DVI-I-D Out**

The ClearView Display Port Output Module plays 100% uncompressed RGB digital video from Display Port or DVI outputs (or VGA analog video) in Progressive (P) mode. The Display Port Output Module can create custom video raster formats. It is completely programmable for video formats that require a bandwidth of 17.28 Gbps or less.

The solution provides a direct video output intended for direct connection to your video display device via one of the three outputs available. Simultaneously to providing the ClearView system video output, one of the outputs may be used as the system desktop graphics output.

The output being used for video communicates with your display using EDID codes. While the Display Port with DVI/VGA Output Module can generate many output rates, your display may not support your settings. In this instance, the ClearView system will inform you of the display problem, and will ask you to choose a different display resolution/rate if the proper code is not present.

CV-DP/DVI-O Playback Standards

Video Formats

640 x 480 @ 60/120fps
720 x 480 @ 60/120fps
720 x 576 @ 50/100fps
800 x 600 @ 60/120fps
1280 x 720 @ 50/60/100/120fps
1600 x 1200 @ 60/72/85fps
1920 x 1080 @ 50/60/100/120fps
2560 X 1600 @ 50/60fps
3840 X 2160 @ 50/60fps

Display Port Digital Video Outputs

DP 1.2 Compliant (2 Outputs, Max Single Output Resolution 3840X2160 at 60 Hz or 1920X1080 at 120Hz)
Pixel Sampling: 4:4:4, RGB
10-bits per component

DVI Digital Video Outputs

DVI-I DL 1.0 Compliant (1 Output, Max Resolution 2560X1600 at 60 Hz)
DVI-I SL 1.0 Compliant (1 Output with supplied DP to DVI adapter)
Pixel Sampling: 4:4:4, RGB
10-bits per component

VGA Analog Video Outputs

HD-15 Female (via supplied DVI to VGA adapter)
Pixel Sampling: 4:4:4, RGB (Max Resolution: 2048x1536 at 85Hz
8-bits per component

In addition to the formats listed above, other formats can be custom created. Parameters include front-porch, back-porch, sync-tip, pixels-per-line, lines-per-frame, etc.

File Format Import Types

Accom YUV CCIR 601 8 Bit
ARI Raw Bayer Pattern
Avid AVR, DS HD/SD, DV (*.gen)
Avid _DNxHD
Avid Meridian & Y'CbCr
Avid OMFI (*.omf, *.omfi)
AVR, JFIF, JPED, Meridian, RGB, Y'CbCr
Cineon (CIN)
CineWave
Digital Negative (.dng)
DPIX (DPX)
DV Movies (*.dv, *.dif)
DVS Direct File Format (*.dvs)
DVSD, DV25, DV50, MPEG-I, MJPEG DigiSuite
H.261
H.263
HDV
Headerless/Raw (*.hdr, *.yuv, *.rgb, *.raw)
HiCon SLB32 RFB format (*.slb)
Image (gif, jpg, png)
Jaleo Direct Format (*.js)
JPEG
JPEG2000
Media 100 MJPEG
Microsoft BMP, DIB Files (*.dps)
Microsoft AVI (*.avi)
MJPEG
MPEG-1 4:2:0 (*.mpg, *.mpeg)
MPEG-2 Elem. Stream, (4:2:0/4:2:2)
MPEG-2 (*.m2v)
MPEG-2 Program Stream, (4:2:0/4:2:2)
MPEG 2/4 in Transport Stream (4:2:0/4:2:2)
MPEG-2 in TS, MPTS (4:2:0/4:2:2)
MPEG-4 Part 2
MPEG-4 /AVC Elementary Stream (4:2:0/4:2:2), (*.h264)
MPEG-4 /AVC in TS, MPTS (4:2:0/4:2:2), (H.264)4:2:0/4:2:2, (*.h264)
MPEG-4 (*.m4v)
MPTS
MXF Format (DV, DVCPro50, MPEG, IMX)
Newtek Video Toaster (*.rtv)
Phantom Support (cine)
Photo CD PCD
PhotoShop FilmStrip (*.flm)
Photoshop PSD
Portable anymap PNM
Portable Bitmap Format PBM DPS
Velocity Portable graymap PGM
Portable pixmap PPM
Profile GXF Format/SMPTE-360 (*.gxf)
QuickTime Movies (*.mov)
QuickTime Formats (with proper codec, ProRes, etc…)
RealVideo (*.ra, *.rm, *.ram)
Red Camera Stream (r3d)
Run-Length encoding (rle)
SGI Movie Format (*.mv)
Silicon Image Bayer (siv)
Sun Raster
Sun Raster (*.ras)
SGI RGB
Targa TGA, ICB, VDA, VST
Targa 3000, Pinnacle
TIFF, TIF
Transport Stream (*.ts)
v210 Y'CbCr 10 Bit product
VC-1 Pro
Viewstore (vsr)
Windows Media (*.asf, *.wmf, *.wmv)
Y'CbCr 8/10
Y'CbCr, RGB
YCrCb 8/RGBA

Audio Import Formats

MPEG-2 Layer 1 (.mp1)
MPEG-2 Layer 3 (.mp3)
Waveform Audio (.wav)
Adaptive Multi-rate (.amr)
Audio Interchange File Format (.aiff)
Windows Media Audio (.wma)
Advanced Audio Coding (.aac)

Exported File Formats

QuickTime with up to 8 audio channels
Microsoft AVI (*.avi), BMP
Headerless/Raw (*.yuv, *rgb, *.raw)